CHAPTER 78

LIST OF EFFECTIVE TEMPORARY REVISIONS

FOLLOWING IS A COMPLETE LISTING OF ALL ACTIVE TEMPORARY REVISIONS (TR'S). TR'S NOT LISTED SHOULD BE REMOVED. THE ATA NUMBER, CONFIG CODE AND PAGE NUMBER IDENTIFIES THE PAGE PRECEDING THE TR.

TR NUMBER	ATA NUMBER	CONFIG CODE	PAGE NUMBER	TR DATE

NONE

CHAPTER 78

EXHAUST

LIST OF EFFECTIVE PAGES

CHAPTER/ SECTION	PAGE	DATE	CONFIG CODE
List of Effective Pages	1	Jun 15/96	
	2	Jun 15/96	
	3	Jun 15/96	
	4	Jun 15/96	
	5	Jun 15/96	
	6	Jun 15/96	
	7/8	Jun 15/96	
Table of Contents	1	Nov 15/86	
	2	Nov 15/86	
	3	May 15/89	
	4	Nov 15/86	
78-conts	1	Jun 15/95	
78-conts	2	Dec 15/92	
78-conts	3	Feb 15/82	
78-conts	4	Dec 15/94	
78-DIAGM	1	Jun 15/93	
78-DIAGM	2	May 15/82	
78-DIAGM	3/4	May 15/82	
78-INDEX	1	Mar 15/91	
78-INDEX	2	Jun 15/93	
78-INDEX	3	May 15/82	
78-INDEX	4	May 15/82	
78-00-00	1	May 15/77	
78-00-00	2	May 15/77	
78-12-00	1	May 15/77	
78-12-00	2	May 15/77	
78-12-00	3/4	May 15/77	
78-12-00	201	Aug 15/82	
78-12-00	202	Aug 15/82	
78-12-00	203	May 15/77	
78-12-00	204	Aug 15/82	
78-12-00	801	May 15/82	
78-12-00	802	May 15/82	
78-12-00	803/804	May 15/82	
78-13-00	1	May 15/77	
78-13-00	2	May 15/77	
78-13-00	3	May 15/77	
78-13-00	4	May 15/77	
78-13-00	5	May 15/77	
78-13-00	6	May 15/77	
78-13-00	7/8	May 15/77	
78-13-01	401	Aug 15/78	
78-13-01	402	Aug 15/78	
78-13-01	403/404	Aug 15/78	
78-13-01	601	Nov 15/85	
R 78-13-01	602	Jun 15/96	
R 78-13-01	603/604	Jun 15/96	
78-13-01	801	May 15/77	
78-13-01	802	May 15/77	
78-13-01	803	May 15/77	
78-13-01	804	May 15/77	
78-13-01	805	May 15/77	
78-13-01	806	May 15/77	
78-13-01	807	May 15/77	
78-13-01	808	May 15/77	
78-13-01	809	May 15/77	
78-13-01	810	May 15/77	
78-13-01	811	May 15/77	
78-13-01	812	May 15/77	
78-13-01	813	May 15/77	
78-13-01	814	May 15/77	
78-13-01	815/816	May 15/77	
78-13-02	401	Aug 15/78	
78-13-02	402	Aug 15/78	
78-13-02	403	Aug 15/78	
78-13-02	404	Aug 15/78	
78-13-02	405	Aug 15/78	
78-13-02	406	Aug 15/78	
78-13-02	601	May 15/77	
78-13-02	602	May 15/82	
78-13-02	603	May 15/77	
78-13-02	604	May 15/77	
78-30-00	1	May 15/89	
78-30-00	2	Jul 15/83	
78-30-00	3	Dec 15/92	
78-30-00	4	Dec 15/92	
78-30-00	5	Jul 15/83	
78-30-00	6	Jul 15/83	
78-30-00	7	Jul 15/83	
78-30-00	8	Jul 15/83	
78-30-00	9	Jul 15/83	
78-30-00	10	May 15/89	

CHAPTER/ SECTION	PAGE	DATE	CONFIG CODE
78-30-00	11	May 15/89	
78-30-00	12	May 15/89	
78-30-00	13	May 15/89	
78-30-00	14	May 15/89	
78-30-00	15	May 15/89	
78-30-00	16	May 15/89	
78-30-00	17	May 15/89	
78-30-00	18	May 15/89	
78-30-00	19	May 15/89	
78-30-00	20	May 15/87	
78-30-00	21	May 15/89	
78-30-00	22	May 15/89	
78-30-00	23	Dec 15/92	
78-30-00	24	Jul 15/83	
78-30-00	25	May 15/89	
78-30-00	26	Jul 15/83	
78-30-00	27	Jul 15/83	
78-30-00	28	Jul 15/83	
78-30-00	29	Jul 15/83	
78-30-00	30	May 15/89	
78-30-00	31	May 15/89	
78-30-00	32	May 15/89	
78-30-00	33	May 15/89	
78-30-00	34	May 15/89	
78-30-00	35/36	May 15/89	
78-30-00	37/38	May 15/89	
78-30-00	39/40	May 15/89	
78-30-00	41/42	May 15/89	
78-30-00	101	May 15/86	
78-30-00	102	Dec 15/92	
78-30-00	103	May 15/86	
78-30-00	104	Nov 15/81	
78-30-00	105	Nov 15/81	
78-30-00	106	Nov 15/81	
78-30-00	107	Nov 15/81	
78-30-00	108	Nov 15/81	
78-30-00	109	May 15/86	
78-30-00	110	Jun 15/93	
78-30-00	111	Mar 15/83	
78-30-00	112	May 15/90	
78-30-00	113	May 15/90	
78-30-00	114	May 15/90	
78-30-00	115	Jun 15/93	
78-30-00	116	Jun 15/95	
78-30-00	117	Jun 15/95	
78-30-00	118	May 15/90	
78-30-00	119	May 15/90	
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78-30-00	121	May 15/90	
78-30-00	122	May 15/90	
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78-30-00	124	May 15/90	
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78-30-00	127	May 15/90	
78-30-00	128	May 15/90	
78-30-00	129	May 15/90	
78-30-00	130	Dec 15/92	
78-30-00	131	Dec 15/92	
78-30-00	132	Dec 15/92	
78-30-00	133/134	Dec 15/92	
78-30-00	135/136	Dec 15/92	
78-30-00	137/138	Dec 15/92	
78-30-00	301	May 15/77	
78-30-00	302	May 15/77	
78-30-00	303	May 15/77	
78-30-00	304	May 15/77	
78-30-00	305	May 15/77	
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78-30-00	307	May 15/77	
78-30-00	308	May 15/77	
78-30-00	501	Nov 15/86	
78-30-00	502	Nov 15/86	
78-30-00	503	Nov 15/86	
78-30-00	504	Nov 15/86	
78-30-00	505	Mar 15/91	
78-30-00	506	Nov 15/86	
78-30-00	507	Nov 15/86	
78-30-00	508	Mar 15/91	
78-30-00	509	Nov 15/86	
78-30-00	510	Nov 15/86	
78-30-00	511	Nov 15/86	
78-30-00	512	Nov 15/86	
78-30-00	513	Mar 15/91	
78-30-00	514	Mar 15/91	
78-30-00	515	Mar 15/91	
78-30-00	516	Mar 15/91	
78-30-00	517	Mar 15/91	
78-30-00	518	Mar 15/91	
78-30-00	519	Mar 15/91	
78-30-00	520	Mar 15/91	
78-30-00	521	Mar 15/91	
78-30-00	522	Mar 15/91	
78-30-00	523	Mar 15/91	
78-30-00	524	Mar 15/91	
78-30-00	525	Mar 15/91	

CHAPTER/ SECTION	PAGE	DATE	CONFIG CODE
78-30-00	526	Mar 15/91	
78-30-00	527	Mar 15/91	
78-30-00	528	Mar 15/91	
78-30-00	529	Mar 15/91	
78-30-00	530	Mar 15/91	
78-30-00	531	Mar 15/91	
78-30-00	532	Mar 15/91	
78-30-00	533	Mar 15/91	
78-30-00	534	Mar 15/91	
78-30-00	535	Mar 15/91	
78-30-00	536	Mar 15/91	
78-30-00	537	Mar 15/91	
78-30-00	538	Mar 15/91	
78-30-00	539	Mar 15/91	
78-30-00	540	Mar 15/91	
78-30-00	541	Mar 15/91	
78-30-00	542	Mar 15/91	
78-30-00	543	Mar 15/91	
78-30-00	544	Mar 15/91	
78-30-00	545	Mar 15/91	
78-30-00	546	Mar 15/91	
78-30-00	547	Mar 15/91	
78-30-00	548	Mar 15/91	
78-30-00	549	Mar 15/91	
78-30-00	550	Mar 15/91	
78-30-00	551	Mar 15/91	
78-30-00	552	Mar 15/91	
78-30-00	553/554	Mar 15/91	
78-30-00	555	Mar 15/91	
78-30-00	556	Mar 15/91	
78-30-00	557	Mar 15/91	
78-30-00	558	Mar 15/91	
78-30-00	559/560	Mar 15/91	
78-30-00	601/602	May 15/77	
78-30-01	201	Dec 15/92	
78-30-01	202	Dec 15/92	
78-30-01	203	Jun 15/95	
78-30-01	204	Dec 15/94	
78-30-01	205	Dec 15/94	
78-30-01	206	Dec 15/94	
78-30-01	207	Dec 15/94	
78-30-01	208	Dec 15/94	
78-30-01	209	Dec 15/94	
78-30-01	210	May 15/86	
78-30-01	211	May 15/86	
78-30-01	212	May 15/86	
78-30-01	213	May 15/86	
78-30-01	214	May 15/86	
78-30-01	215	May 15/86	
78-30-01	216	May 15/86	
78-30-01	217	May 15/86	
78-30-01	218	May 15/86	
78-30-01	219	May 15/86	
78-30-01	220	Dec 15/92	
78-30-01	221	Dec 15/92	
78-30-01	222	Dec 15/92	
78-30-01	223	Dec 15/92	
78-30-01	224	Dec 15/92	
78-30-01	225	Dec 15/92	
78-30-01	226	Dec 15/92	
78-30-01	227	Dec 15/92	
78-30-01	228	Dec 15/92	
78-30-01	229	Dec 15/92	
78-30-01	230	Dec 15/92	
78-30-01	231/232	Jun 15/95	
78-31-00	601	Nov 15/88	
78-31-00	602	Nov 15/88	
78-31-00	603	Nov 15/88	
78-31-00	604	Mar 15/91	
78-31-00	605	Mar 15/91	
78-31-00	606	Nov 15/88	
78-31-00	607	Mar 15/91	
78-31-00	608	Mar 15/91	
78-31-00	609	Mar 15/91	
78-31-00	610	Mar 15/91	
78-31-00	611/612	Mar 15/91	
78-31-00	801	Dec 15/95	
78-31-00	802	Dec 15/95	
78-31-00	803	Dec 15/95	
78-31-00	804	Dec 15/95	
78-31-00	805	Dec 15/95	
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78-31-00	809	Dec 15/95	
78-31-00	810	Dec 15/95	
78-31-00	811	Dec 15/95	
78-31-00	812	Dec 15/95	
78-31-00	813	Dec 15/95	
78-31-00	814	Dec 15/95	
78-31-00	815	Dec 15/95	
78-31-00	816	Dec 15/95	
78-31-00	817	Dec 15/95	
78-31-00	818	Dec 15/95	
78-31-00	819	Dec 15/95	
78-31-00	820	Dec 15/95	

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78-31-00	821	Dec 15/95	
78-31-00	822	Dec 15/95	
78-31-00	823	Dec 15/95	
78-31-00	824	Dec 15/95	
78-31-00	825	Dec 15/95	
78-31-00	826	Dec 15/95	
78-31-01	201	May 15/90	
78-31-01	202	May 15/90	
78-31-01	203/204	May 15/90	
78-31-02	201	May 15/77	
78-31-02	202	May 15/77	
78-31-02	203	May 15/77	
78-31-02	204	May 15/77	
78-31-02	205	May 15/77	
78-31-02	206	May 15/77	
78-31-02	207	May 15/77	
78-31-02	208	May 15/77	
78-31-02	209/210	May 15/77	
78-31-03	301	May 15/77	
78-31-03	302	May 15/77	
78-31-03	303/304	May 15/77	
78-31-03	401	Nov 15/86	
78-31-03	402	Nov 15/86	
78-31-03	403	May 15/77	
78-31-03	404	May 15/77	
78-31-03	405	May 15/77	
78-31-03	406	Nov 15/86	
78-31-03	407	Nov 15/86	
78-31-03	408	Nov 15/86	
78-31-03	409/410	Nov 15/86	
78-31-03	601	Nov 15/86	
78-31-03	602	Nov 15/86	
78-31-03	603	Nov 15/86	
78-31-03	604	Nov 15/86	
78-31-03	605/606	Nov 15/86	
78-31-07	201	Dec 15/92	
78-31-07	202	Nov 15/85	
78-31-07	203	Dec 15/92	
78-31-07	204	Dec 15/92	
78-31-07	205	Dec 15/92	
78-31-07	206	Nov 15/85	
78-31-07	207	Nov 15/85	
78-31-07	208	Nov 15/85	
78-31-07	209	Nov 15/85	
78-31-07	210	Nov 15/85	
78-31-07	211	Nov 15/85	
78-31-07	212	Aug 15/82	
78-31-07	213	Aug 15/82	

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78-31-07	214	May 15/89	
78-31-07	215	Aug 15/82	
78-31-07	216	Aug 15/82	
78-31-07	801	Mar 15/81	
78-31-07	802	Mar 15/81	
78-31-08	401	Nov 15/86	
78-31-08	402	Nov 15/86	
78-31-08	403	May 15/78	
78-31-08	404	May 15/78	
78-31-08	405	May 15/82	
78-31-08	406	May 15/78	
78-31-08	407	Nov 15/86	
78-31-08	408	Nov 15/86	
78-31-08	409	Nov 15/86	
78-31-08	410	Nov 15/86	
78-31-08	411	Nov 15/86	
78-31-08	412	Nov 15/86	
78-31-08	413	Nov 15/86	
78-31-08	414	Nov 15/86	
78-31-08	415	Nov 15/86	
78-31-08	416	Nov 15/86	
78-31-08	417	Nov 15/86	
78-31-08	418	Nov 15/86	
78-31-08	419	Nov 15/86	
78-31-08	420	Nov 15/86	
78-31-08	421/422	Nov 15/86	
78-31-08	601	May 15/89	
78-31-08	602	May 15/89	
78-31-09	401	Aug 15/78	
78-31-09	402	Aug 15/78	
78-31-09	403	Aug 15/78	
78-31-09	404	Aug 15/78	
78-31-09	405	Aug 15/78	
78-31-09	406	Aug 15/78	
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78-31-09	408	Aug 15/78	
78-31-09	409	Aug 15/78	
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78-31-09	411	Aug 15/78	
78-31-09	412	Aug 15/78	
78-31-09	413	Aug 15/78	
78-31-09	414	Aug 15/78	
78-31-09	415	Aug 15/78	
78-31-09	416	Aug 15/78	
78-31-09	417	Aug 15/78	
78-31-09	418	Aug 15/78	
78-31-09	419	Aug 15/78	
78-31-09	420	Aug 15/78	

CHAPTER/ SECTION	PAGE	DATE	CONFIG CODE
78-31-09	421/422	Aug 15/78	
78-31-09	601	May 15/77	
78-31-09	602	May 15/77	
78-31-10	401	May 15/77	
78-31-10	402	May 15/77	
78-31-10	403/404	May 15/77	
78-31-11	401	May 15/77	
78-31-11	402	May 15/77	
78-31-11	403/404	May 15/77	
78-31-16	201	May 15/89	
78-31-16	202	May 15/89	
78-31-16	203	May 15/89	
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78-31-16	206	May 15/89	
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78-31-16	209	May 15/89	
78-31-16	210	May 15/89	
78-31-16	211	May 15/89	
78-31-16	212	May 15/89	
78-31-17	401	Dec 15/80	
78-31-17	402	Nov 15/78	
78-31-17	403	Dec 15/80	
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78-31-17	405	Dec 15/80	
78-31-17	406	Dec 15/80	
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78-31-17	430	Dec 15/80	
78-31-17	431	Dec 15/80	
78-31-17	432	Dec 15/80	
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78-31-17	434	Dec 15/80	
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78-31-17	442	Dec 15/80	
78-31-17	443	Dec 15/80	
78-31-17	444	Dec 15/80	
78-31-17	445/446	Dec 15/80	
78-31-17	601	May 15/77	
78-31-17	602	May 15/77	
78-31-18	201/202	May 15/77	
78-31-19	201	Nov 15/78	
78-31-19	202	Nov 15/78	
78-31-19	203	Nov 15/78	
78-31-19	204	Nov 15/78	
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78-31-19	221	Nov 15/78	
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78-31-19	223	Nov 15/78	
78-31-19	224	Nov 15/78	
78-31-19	225	Nov 15/78	
78-31-19	226	Nov 15/78	
78-31-19	227	Nov 15/78	

CHAPTER/ SECTION	PAGE	DATE	CONFIG CODE
78-31-19	228	Nov 15/78	
78-31-19	229	Nov 15/78	
78-31-19	230	Nov 15/78	
78-31-19	231	Nov 15/78	
78-31-19	232	Nov 15/78	
78-31-19	233	Nov 15/78	
78-31-19	234	Nov 15/78	
78-31-19	235	Nov 15/78	
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78-31-19	239	Nov 15/78	
78-31-19	240	Nov 15/78	
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78-31-19	246	Nov 15/78	
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78-31-19	248	Nov 15/78	
78-31-20	201	May 15/88	
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78-31-20	203	May 15/88	
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78-31-20	209	May 15/88	
78-31-20	210	May 15/88	
78-31-20	211	May 15/88	
78-31-20	212	May 15/88	
78-31-20	213	May 15/88	
78-31-20	214	May 15/88	
78-31-20	601	May 15/89	
78-31-20	602	Aug 15/82	
78-31-20	603/604	May 15/89	
78-31-35	201	Nov 15/85	
78-31-35	202	Nov 15/85	
78-31-35	203	Nov 15/85	
78-31-35	204	Nov 15/85	
78-31-36	301	Dec 15/80	
78-31-36	302	Dec 15/80	
78-31-36	303/304	Dec 15/80	
78-31-36	401	Aug 15/81	
78-31-36	402	Aug 15/81	
78-31-36	403	Aug 15/81	
78-31-36	404	Aug 15/81	
78-31-36	405	Aug 15/81	
78-31-36	406	Aug 15/81	
78-31-36	407	Aug 15/81	
78-31-36	408	Aug 15/81	
78-31-36	409	Aug 15/81	
78-31-36	410	Aug 15/81	
78-31-36	411	Aug 15/81	
78-31-36	412	Aug 15/81	
78-31-36	413	Aug 15/81	
78-31-36	414	Aug 15/81	
78-31-36	415	Aug 15/81	
78-31-36	416	Aug 15/81	
78-31-36	417/418	Aug 15/81	
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78-31-37	202	Feb 15/78	
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78-31-43	201	May 15/77	
78-31-43	202	May 15/77	
78-31-43	203/204	May 15/77	
78-31-44	201	May 15/77	
78-31-44	202	May 15/77	
78-31-44	203	May 15/77	
78-31-44	204	May 15/77	
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78-31-50	402	May 15/77	
78-31-50	403	May 15/77	
78-31-50	404	May 15/77	
78-31-50	405	May 15/82	
78-31-50	406	May 15/77	
78-31-50	407	May 15/77	
78-31-50	408	May 15/77	
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78-31-50	410	May 15/82	
78-31-51	401	May 15/89	
78-31-51	402	May 15/89	

CHAPTER/ SECTION	PAGE	DATE	CONFIG CODE	CHAPTER/ SECTION	PAGE	DATE	CONFIG CODE
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78-31-51	404	May 15/89					
78-31-51	405	May 15/89					
78-31-51	406	May 15/89					
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EXHAUST

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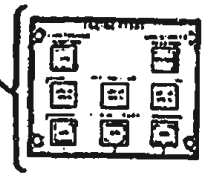
POWER PLANT CONTENTS

GROUND START VALVE OPEN LIGHT
STARTING
FAILURE TO RELIGHT/REACH IDLE–WINDMILLING
FAILURE TO RELIGHT/REACH IDLE–STARTER ASSIST

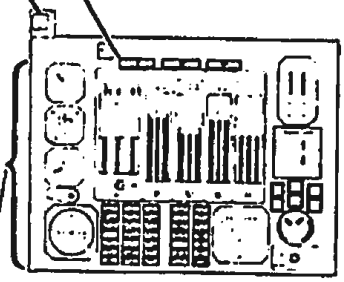
REVERSE THRUST
REVERSE THRUST SELECTED
REVERSE THRUST CANCELLED
IN FLIGHT

ENG 2 FAIL LIGHT
STARTING
POSSIBLE OVERTEMPERATURE/HIGH TEMPERATURE
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FF/FUEL USED INDICATOR
N1 INDICATOR
N3 INDICATOR
TGT INDICATOR
OVERTEMPERATURE (EXCEPT STARTING)
OVERTEMPERATURE (STARTING AND RELIGHTING)

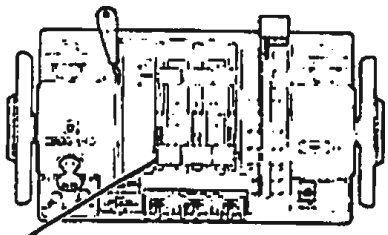
DECREASE/FLUCTUATION OF POWER
THROTTLE STAGGER



(CENTER CONSOLE)



(CENTER INSTRUMENT PANEL)

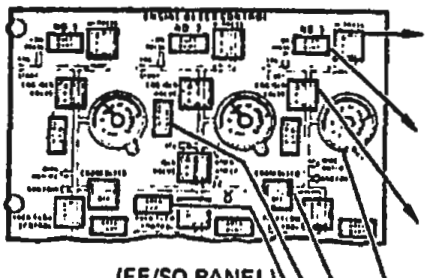


(PILOTS OVERHEAD PANEL)

M1–0001–71–8504

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POWERPLANT CONTENTS



(FE/SO PANEL)

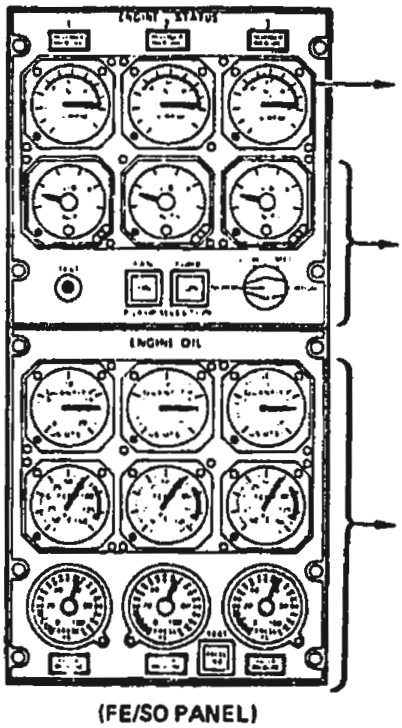
CROSSBLEED START
ENGINE BLEED AIR
NACELLE/PYLON
OVERHEAT DETECTION

DUCT OVHT, ENGINE (1, 2, OR 3)

GROUND START VALVE
OPEN LIGHT
ENGINE BLEED AIR

CROSSBLEED START
POSSIBLE
OVERTEMPERATURE/HIGH
TEMPERATURE
ENGINE BLEED AIR

CROSSBLEED START
AREA OVHT, BLEED AIR
(J)
AREA OVERHEAT TEST
AREA OVHT, BLEED AIR
(D, E, OR H)



(FE/SO PANEL)

STARTING

AIRBORNE VIBRATION
MONITOR
N2 OVERSPEED
N2 INDICATOR

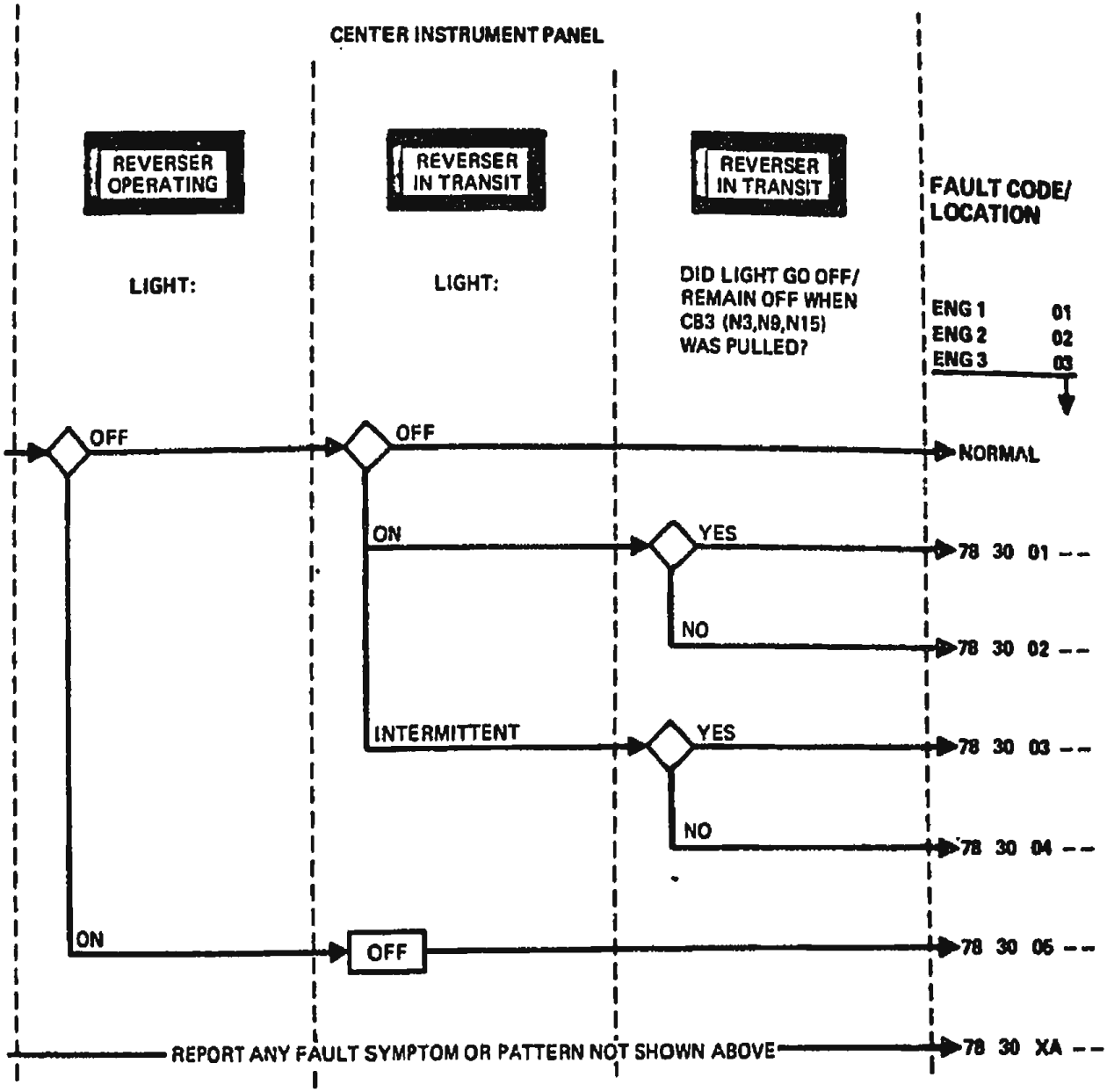
ABNORMAL OIL SYSTEM
INDICATIONS
RISE IN FUEL/OIL
TEMPERATURE
STARTING
OIL PRESSURE LOW/HIGH
OIL FILTER PRESSURE
LIGHT
ENGINE FLAMEOUT

TITLE	CHAP/SEC
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M1-0002-71-8505

R

EXHAUST CONTENTS



APPLICABLE CIRCUIT BREAKERS

3N 3, 9, 15 START AIR VALVE

3N 4, 10, 16 REV IND

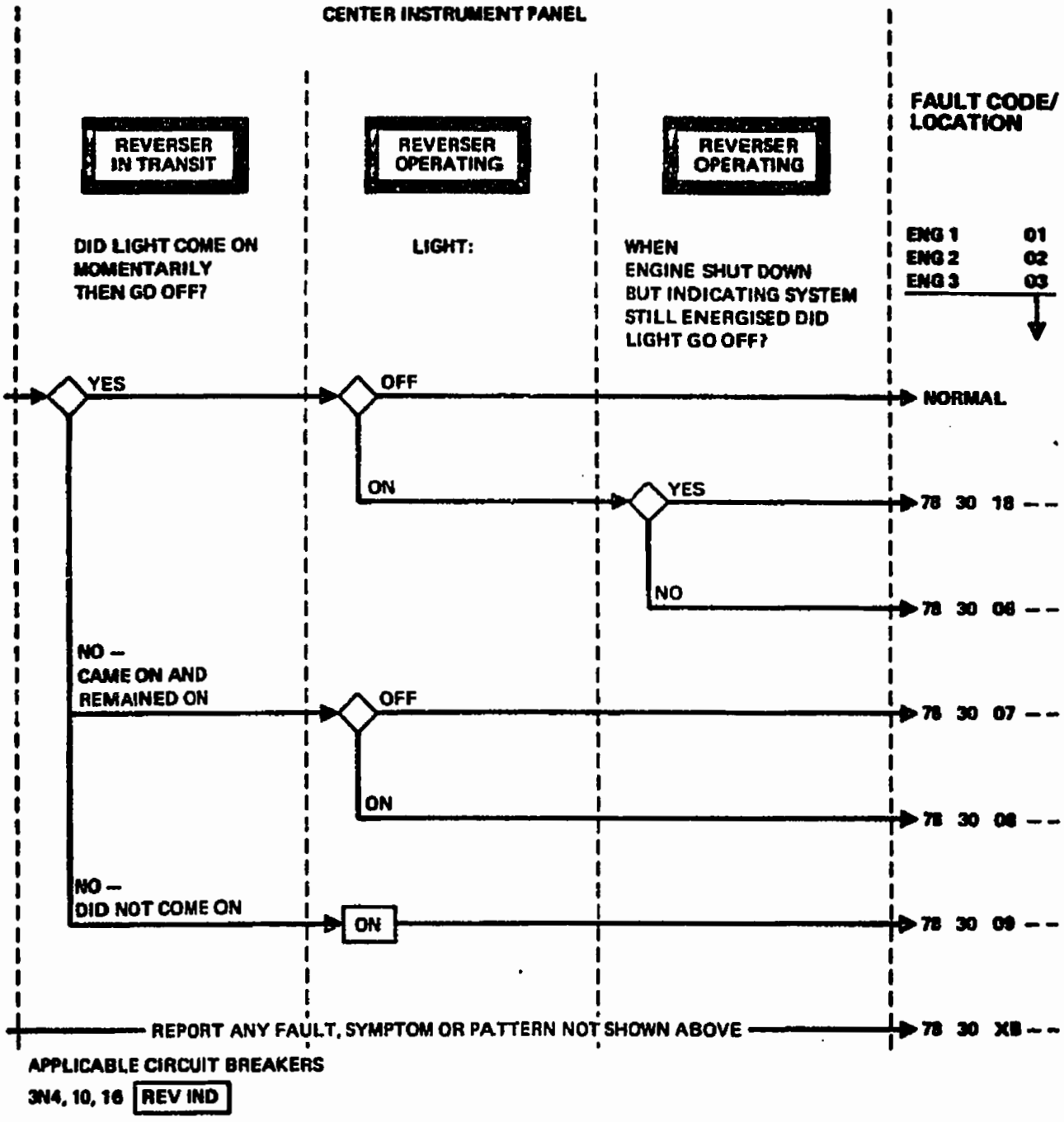
45884A

ED1-0007-78-1056

R Thrust Reverser In Flight - Fault Codes
Figure 1

EFFECTIVITY: ALL

78-FAULT CODE DIAGRAM

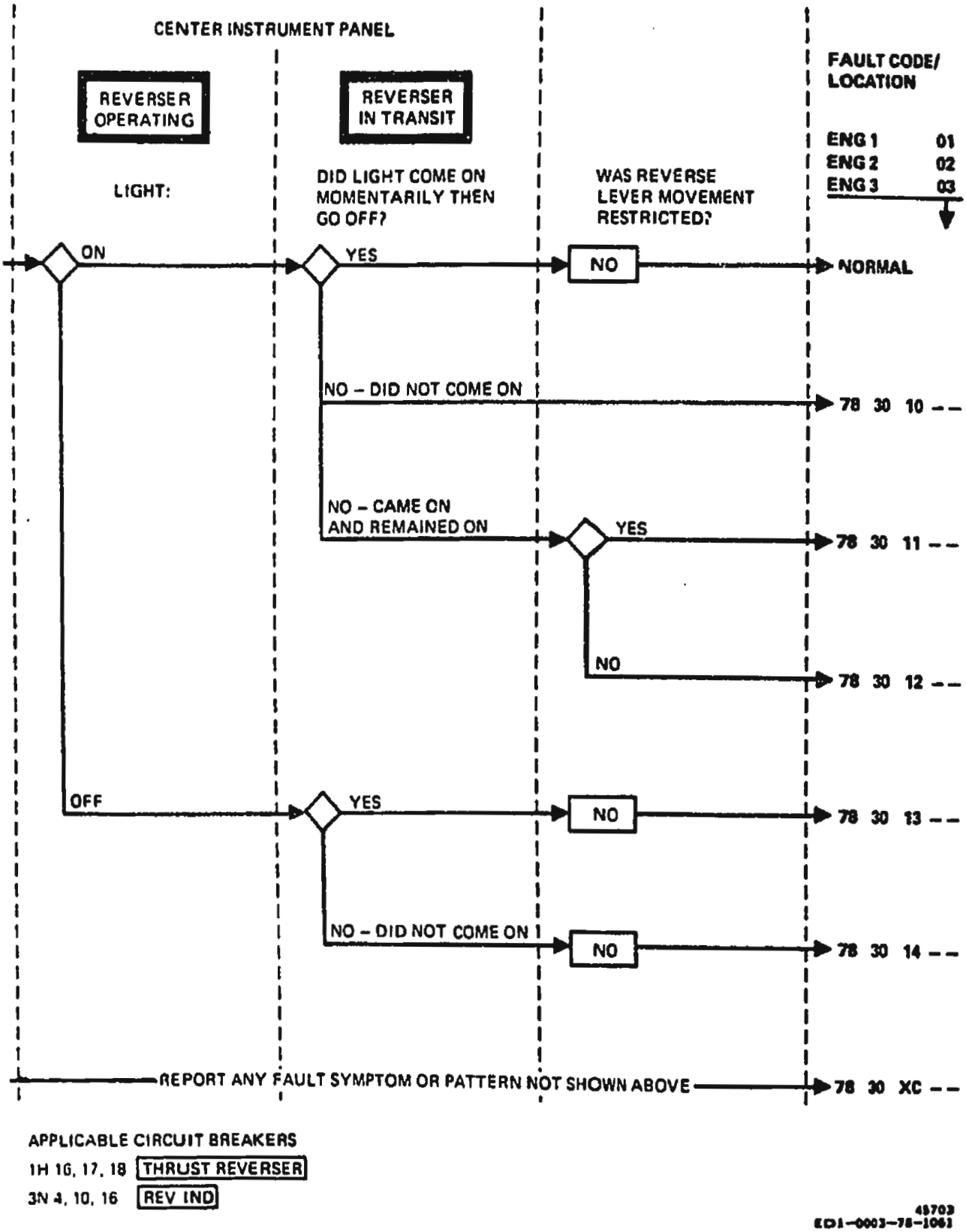


EDI-0003-78-1040A

R Thrust Reverser Cancelled - Fault Codes
Figure 2

EFFECTIVITY: ALL

78-FAULT CODE DIAGRAM



APPLICABLE CIRCUIT BREAKERS
1H 16, 17, 18 THRUST REVERSER
3N 4, 10, 16 REV IND

45703
EDI-0003-78-1061

R Thrust Reverser Selected - Fault Codes
Figure 3

EFFECTIVITY: ALL

78-FAULT CODE DIAGRAM

FAULT CODE INDEX
TABLE 1

FAULT CODE	1. LOG BOOK REPORT 2. FAULT ISOLATION REFERENCE
78 30 XA __	1. A Thrust Reverser In Flight fault was encountered by the crew which is not covered in the fault code diagram. (Ref. Fault Code diagram for flight crew actions.)
	2. 78-30-00 Fig. 103 Block 1 78-30-00 Fig. 104 Block 1 78-30-00 Fig. 105 Block 1
78 30 XB __	1. A Thrust Reverser Cancelled fault was encountered by the crew which is not covered in the fault code diagram. (Ref. Fault Code diagram for flight crew actions.)
	2. 78-30-00 Fig. 103 Block 1 78-30-00 Fig. 104 Block 1 78-30-00 Fig. 105 Block 1 78-30-00 Fig. 106 Block 1 78-30-00 Fig. 107 Block 1
78 30 XC __	1. A Thrust Reverser Selected fault was encountered by the crew which is not covered in the fault code diagram. (Ref. Fault Code diagram for flight crew actions.)
	2. 78-30-00 Fig. 108 Block 1 78-30-00 Fig. 109 Block 1 78-30-00 Fig. 110 Block 1 78-30-00 Fig. 111 Block 1 78-30-00 Fig. 112 Block 1
R 78 30 01 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) REVERSER IN TRANSIT light on in flight and off when CB3 (N3, N9, N15) was pulled. REVERSER OPERATING light off.
	2. 78-30-00 Fig. 104 Block 6

FAULT CODE INDEX
TABLE 1 (CONTINUED)

FAULT CODE	1. LOG BOOK REPORT 2. FAULT ISOLATION REFERENCE
78 30 02 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) REVERSER IN TRANSIT light on in flight but did not go off when CB3 (N3, N9, N15) was pulled. REVERSER OPERATING light off. 2. 78-30-00 Fig. 104 Block 11
R 78 30 03 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) REVERSER IN TRANSIT light on intermittently in flight and off when CB3 (N3, N9, N15) was pulled. REVERSER OPERATING light off. 2. 78-30-00 Fig. 104 Block 6
R 78 30 04 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) REVERSER IN TRANSIT light on intermittently in flight but did not go off when CB3 (N3, N9, N15) was pulled. REVERSER OPERATING light off. 2. 78-30-00 Fig. 104 Block 11
78 30 05 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) REVERSER OPERATING light on in flight. REVERSER IN TRANSIT light off. 2. 78-30-00 Fig. 105 Block 4
78 30 06 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) REVERSER IN TRANSIT light came on momentarily then went off when reverse thrust cancelled. REVERSER OPERATING light on and remained on when engine shut down. 2. 78-30-00 Fig. 105 Block 6
78 30 07 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) REVERSER IN TRANSIT light remained on when reverse thrust cancelled. REVERSER OPERATING light off 2. 78-30-00 Fig. 104 Block 1

FAULT CODE INDEX
TABLE 1 (CONTINUED)

FAULT CODE	1. LOG BOOK REPORT 2. FAULT ISOLATION REFERENCE
R 78 30 08 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) REVERSER IN TRANSIT and REVERSER OPERATING lights remained on when reverse thrust cancelled.
	2. 78-30-00 Fig. 108 Block 1
R 78 30 09 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) REVERSER IN TRANSIT light did not come on and REVERSER OPERATING light remained on when reverse thrust cancelled.
	2. 78-30-00 Fig. 107 Block 1
R 78 30 10 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) REVERSER IN TRANSIT light did not come on when reverse thrust selected. REVERSER OPERATING light on.
	2. 78-30-00 Fig. 110 Block 1
R 78 30 11 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) REVERSER IN TRANSIT light remained on when reverse thrust selected. REVERSER OPERATING light on. Reverser lever movement restricted.
	2. 78-30-00 Fig. 108 Block 1
R 78 30 12 __	1. (01=ENG 1, 03=ENG 2, 03=ENG 3) REVERSER IN TRANSIT light remained on when reverse thrust selected. REVERSER OPERATING light on. Reverser lever movement was not restricted.
	2. 78-30-00 Fig. 109 Block 1
R 78 30 13 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) REVERSER OPERATING light did not come on when reverse thrust selected. REVERSER IN TRANSIT light came on momentarily then went off. Reverse lever movement was not restricted.
	2. 78-30-00 Fig. 112 Block 1

FAULT CODE INDEX
TABLE 1

FAULT CODE	1. LOG BOOK REPORT 2. FAULT ISOLATION REFERENCE
R 78 30 14 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) no thrust reverser light indications when reverse thrust selected. Reverser lever movement was not restricted. 2. 78-30-00 Fig. 111 Block 1
78 30 15 00	1. NOT USED.
78 30 16 00	1. NOT USED.
78 30 17 00	1. NOT USED.
R 78 30 18 __	1. (01=ENG 1, 02=ENG 2, 03=ENG 3) REVERSER IN TRANSIT light came on momentarily then wnet off when reverse thrust cancelled. REVERSER OPERATING light remained on but went off when engine shut down. 2. 78-30-00 Fig. 105 Block 2

EXHAUST - DESCRIPTION AND OPERATION

1. General

The exhaust system receives the by-pass and turbine discharge gases and passes them through separate propelling nozzles to atmosphere, at a velocity, and in the required direction, to provide the resultant thrust.

Service Bulletins referred to:

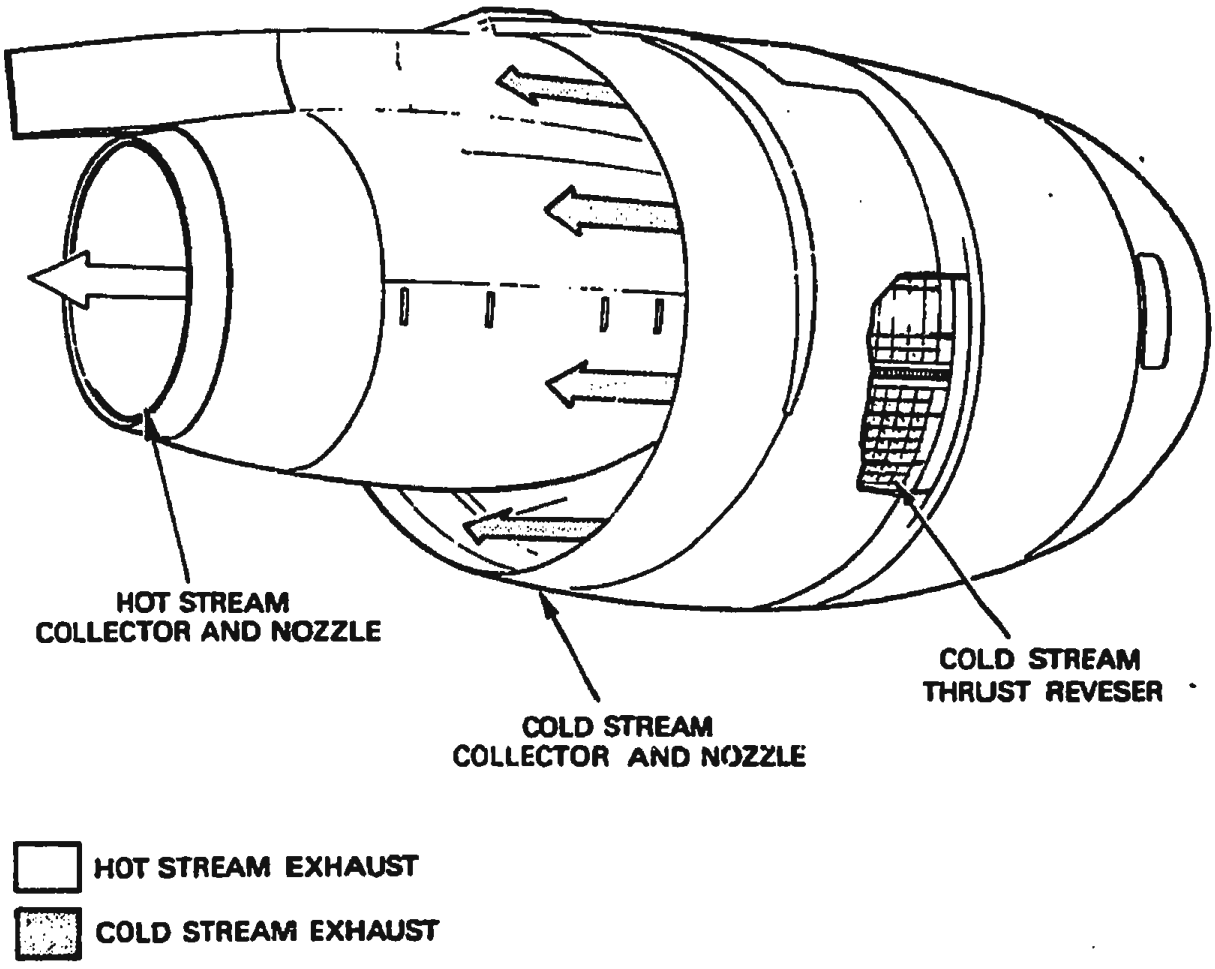
S.B.78-2969 - Deletion of Hot Stream Spoiler System and Introduction of 11 Degree Exhaust Collector.
S.B.78-3551 - Introduction of 15 Degree Afterbody

2. Description

The exhaust system (fig.1) accommodates two gas streams: the cold (by-pass) stream ejecting from the L.P. compressor, and the hot stream ejecting from the turbines. The two streams are discharged through separate co-axial nozzles, forming convergent ducts to produce an increase in gas velocity.

The cold stream exhaust comprises an exhaust collector and nozzle (Ref. 78-12-00) incorporating a thrust reverser system (Ref. 78-30-00). The hot stream exhaust comprises an exhaust collector and nozzle (Ref. 78-13-00) that on S.B.78-2969 engines feature an 11 detree afterbody and on S.B.78-3551 engines feature a 15 degree afterbody.

Fig.1 illustrates the S.B.78-3551 exhaust system in the normal, forward thrust configuration.



Engine exhaust system
Fig.1

COLD STREAM COLLECTOR AND NOZZLE SYSTEM - DESCRIPTION AND OPERATION

1. General

The cold stream collector and nozzle receives the gas efflux from the L.P. compressor and directs it to atmosphere in the required direction, depending on whether forward or reverse thrust is selected.

2. Description

The unit (fig.1) comprises a cold stream duct and a propelling nozzle. The cold stream duct is located on the rear flange of the L.P. compressor case and incorporates the cold stream thrust reverser (Ref. 78-31-00).

The cold stream nozzle, located on the rear flange of the cold stream reverser, is 'C' shaped to clear the interservices fairing. The nozzle is of double skin construction with noise attenuating panels bonded to the inner skin over approximately half the nozzle length. The leading edge of the nozzle outer skin follows the contour of the translating cowl (Ref. 78-31-07) around the lower section.

A nozzle extension and seal assembly, interposed between the reverser/nozzle attachment flanges, extends forward over the rear ring of the reverser case (Ref. 78-31-06). The seal comprises segments of spring fingers, rivetted along the leading edge of the nozzle extension, which engage the inner surface of the translating cowl to provide a seal between cowl and nozzle in the forward thrust position.

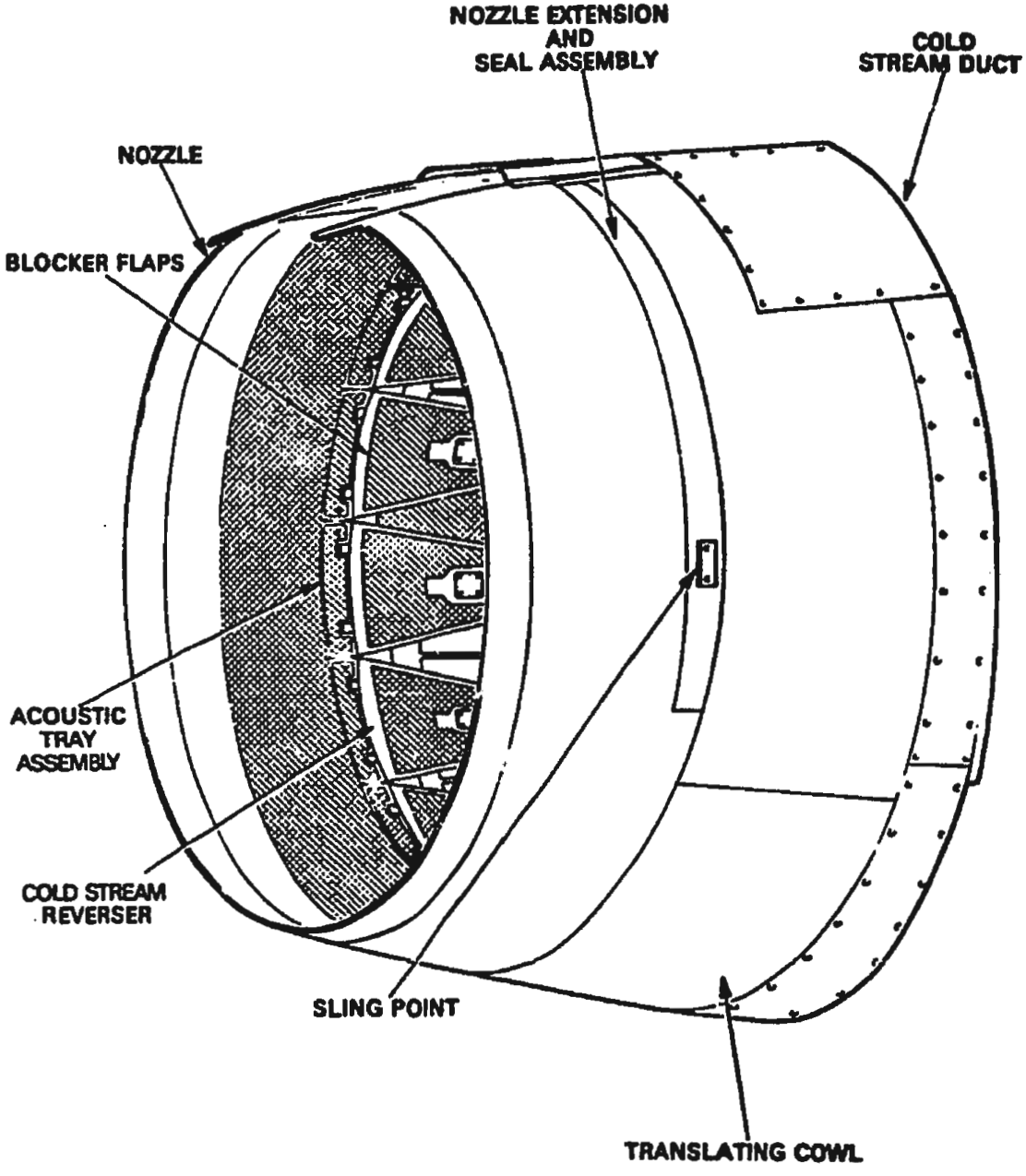
Two small panels incorporated in the nozzle extension and seal assembly, provide access to the thrust reverser slinging points (Ref. 78-31-00).

Brackets secured to the inside of the reverser rear attachment flange, provide attachment for a duct make-up piece, comprising acoustic tray assemblies. These fill the space between reverser and nozzle over the mating flanges on the inside of the duct to provide a continuous duct line.

3. Operation

The cold (by-pass) gas stream enters the exhaust collector and, during forward thrust operation, is directed rearward through the cold stream nozzle, which forms a convergent duct, producing an increase in velocity as the gas stream is expelled to atmosphere.

During reverser thrust operation, the cold stream nozzle is blanked off by the reverser blocker flaps, which fold inward and direct the gas stream into the deflector vanes (Ref. 78-31-20) to effect reverse thrust. Operation of the thrust reverser system is described in 78-30-00.



Cold stream collector and nozzle
Fig.1

COLD STREAM COLLECTOR AND NOZZLE - MAINTENANCE PRACTICES

1. Removal/Installation Cold Stream Nozzle

WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION (REF. 78-30-00, SERVICING) WHILE WORK IS IN PROGRESS.

CAUTION: THE WEIGHT OF THE COLD STREAM NOZZLE IS APPROXIMATELY 74 LB. (33,566 KG.).

A. Remove Cold Stream Nozzle (Zone 415, 425, 435)

(1) Tag throttle and thrust reverser levers, and APU/GND AIR reverser switches

(2) Open and tag appropriate THRUST REVERSE circuit breaker on pilot's overhead circuit breaker panel CB1, zone 210

(3) Open and tag appropriate START AIR VALVE circuit breaker on flight engineer/second officer's aft circuit breaker panel CB3, zone 215

(4) Tag appropriate ENGINE START panel switchlights

(5) Refer to fig.201, remove screws (1) and remove acoustic trays (2) from L.H. and R.H. top positions; remove screws (1) and remove remaining acoustic trays (3)

(6) Remove fairings (12) (No.1 or No.3 engine installation) or (13) (No.2 engine installation)

(7) Remove bolts and washers (11), identify individual bolt positions for correct assembly during installation (para.B.), remove brackets (9) and blister fairings (10).

(8) Remove bolts and washers (7), remove brackets (8) (No.1 or 3 engine installation).

R (9) CAUTION: DURING REMOVAL OF THE COLD STREAM NOZZLE
R CARE MUST BE TAKEN TO PREVENT THE NOZZLE
R EXTENSION AND SEAL ASSEMBLY BEING DISENGAGED
R FROM THE SEAL RETAINER SECURED TO THE FIXED
R STRUCTURE.

Manually support nozzle (6), remove bolts and washers
R (4) and (5) and remove nozzle taking care that the
R nozzle extension and seal assembly (trapped between
R the cold stream nozzle and thrust reverser case rear
R flange) remains in contact with the reverser case
R rear flange.

B. Install Cold Stream Nozzle

(1) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Degreasing fluid (Inhibited and stabilized 1.1.1. trichloroethane)	B.S.4487	Mil-T-81533	1/21
Jointing compound	DTD.900/4586 (Hylomar light)	-	426

(2) Ensure appropriate systems are tagged as detailed in operation A.(1) through (4)

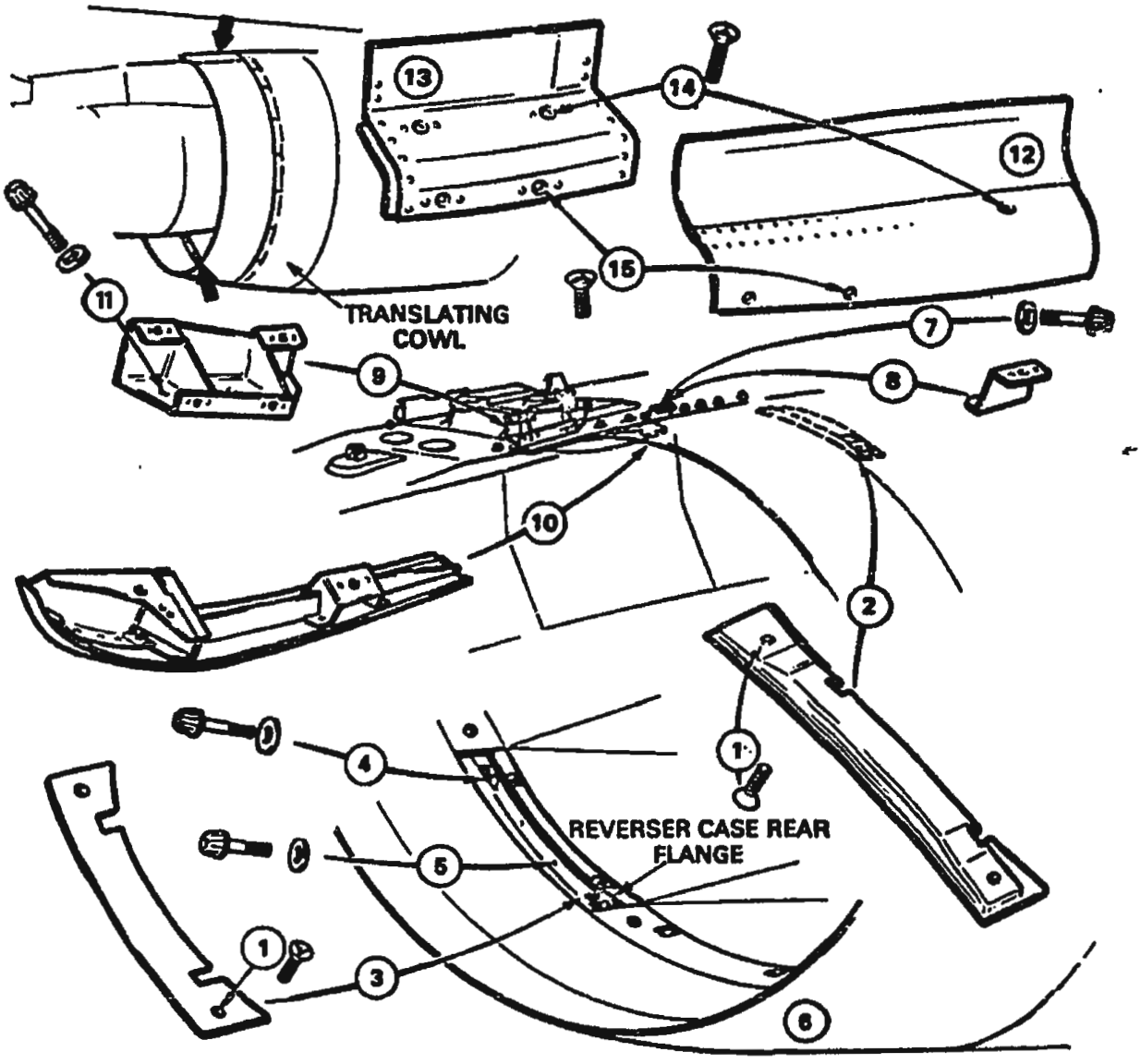
(3) Using degreasing fluid, clean mating faces of reverser case and nozzle and allow to dry.

WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE VENTILATION AND AVOID SKIN CONTACT AND INHALATION OF VAPOUR.

(4) Apply jointing compound to both mating faces and allow to dry for a minimum period of 10 minutes.

(5) Refer to fig.201, slide nozzle (6) under hoop plate and position on three locating dowels on reverser case rear flange.

(6) Fit bolts and washers (4) to bracket positions on nozzle flange and bolts and washers (5) to remaining positions; do not secure at this stage.



1. Screw, securing acoustic tray (30 off)
2. Acoustic tray (2 off)
3. Acoustic tray (13 off)
4. Bolt, securing nozzle to reverser (32 off)
5. Bolt, securing nozzle to reverser (17 off)
6. Cold stream nozzle
7. Bolt, securing bracket to hoop plate (4 off)
8. Bracket (No. 1 and No. 3 engine) (2 off)
9. Bracket (2 off)
10. Internal blister fairing (2 off)
11. Bolt, securing nozzle to hoop plate (18 off)
12. Cowl/pylon fairing (No. 1 and No. 3 engine) (2 off)
13. Cowl/pylon fairing (No. 2 engine) (2 off)
14. Screw, securing fairing (2 off)
15. Screw, securing fairing (4 off—No. 1 and No. 3 engine) (6 off—No. 2 engine)

26147A

R Cold stream nozzle removal/installation
R Fig.201

(7) Position brackets (9) at bolt positions 2, 3 and 4 from rear of nozzle, position blister fairings (10) inside nozzle at bolt positions 3 and 6, fit correct bolts and washers (11) to these positions; do not secure at this stage.

(8) On No.1 or No.3 engine installation, position brackets (8) at bolt positions 7 and 8 and fit correct bolts and washers (7); do not secure at this stage

(9) Fit remaining bolts and washers (11) in correct positions.

(10) Secure all bolts (11), (4), (7) and (5).

(11) On No.1 or No.3 engine installation, position fairings (12) on brackets (8) and (9); secure with screws (14) and (15)

(12) On No.2 engine installation, position fairings (13) on brackets (9); secure with screws (14) and (15)

(13) Fit acoustic trays (2) at L.H. and R.H. top positions and secure with screws (1)

(14) Fit remaining acoustic trays (3) and secure with screws (1)

(15) Remove tags and close circuit breakers opened in A.(1) through (4).

CR COLD STREAM COLLECTOR AND NOZZLE - REPAIR

CR 1. Deflector Vane Mounting Bracket Repair:

CR NOTE: The following repair is applicable to brackets B C
CR and D only (See Figure 801).

CR A. Locate stainless steel prefabricated bracket P/N C01378-5
CR (TWA Stk Nbr 61-3351) on broken or cracked deflector vane
CR mounting bracket as shown in Figure 802.

CR B. Line up 1/4 inch holes of prefabricated bracket with
CR 1/4 inch holes of mounting bracket.

CR C. Clamp prefabricated bracket on existing mounting bracket.

CR D. Use the 3/16 inch holes (three places) as guide, drill
CR three holes through mounting bracket using size 12 drill
CR bits.

CR E. Attach prefabricated bracket on existing mounting bracket
CR with 3 each 3/16 inch bolts (TWA Stk Nbr 32-3759) and nuts
CR (TWA Stk Nbr 42-1218) or equivalent.

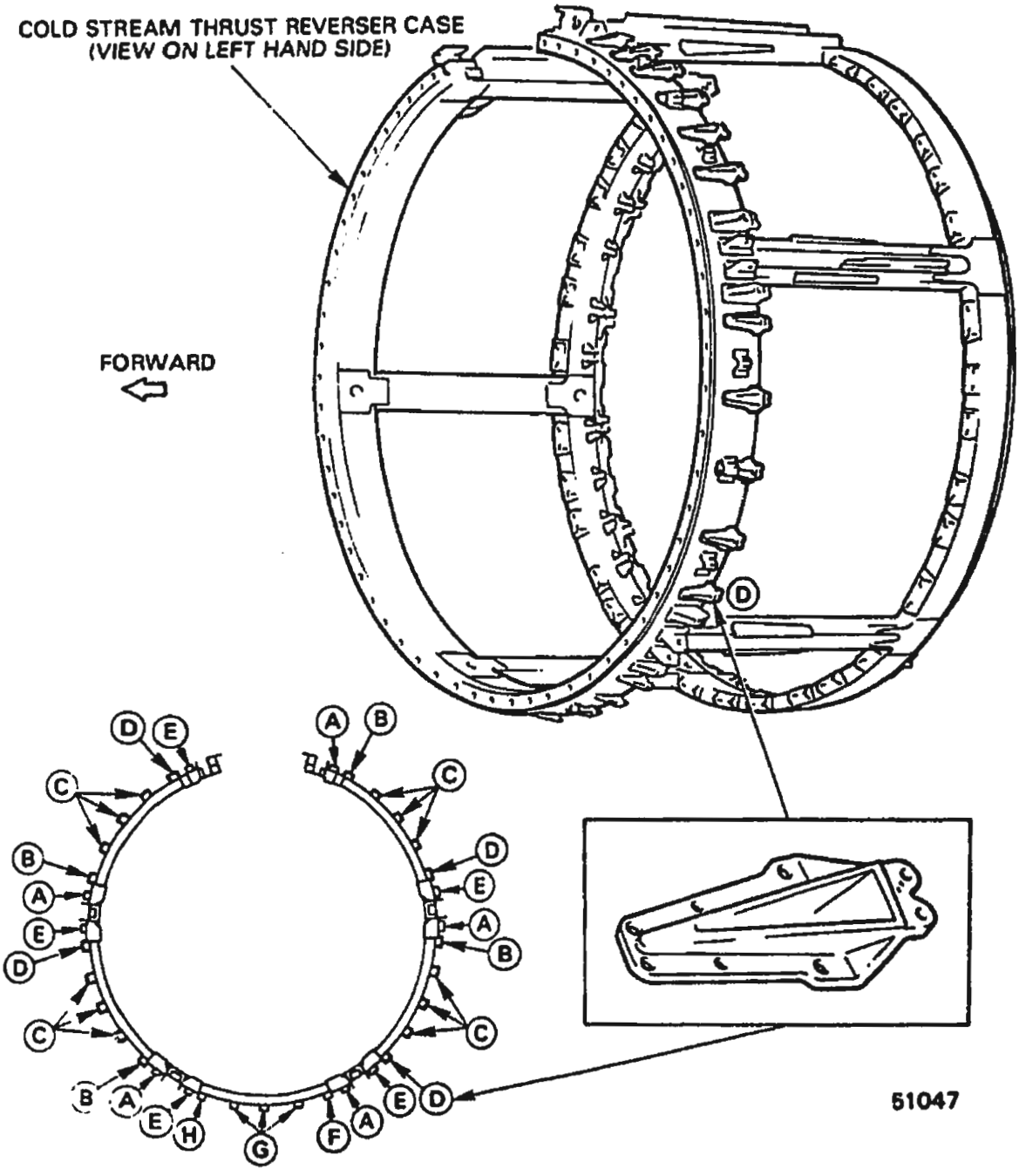
CR NOTE: After bracket repair, the following precaution must
CR be taken before deflector vane installation.

CR (1) Ream 1/4 inch if required.

CR (2) A longer 1/4 inch bolt (TWA Stk Nbr 60-4995) shall be
CR used.

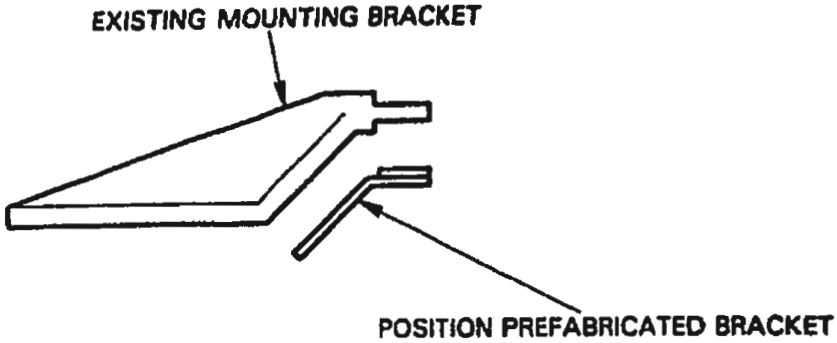
CR (3) Install 3 each spacer washers (TWA Stk Nbr 43-0037)
CR on other brackets to prevent twisting of the deflector
CR vane.

CR (4) If it is necessary to fabricate bracket, see Figure
CR 802/803 for detail.



CR
CR

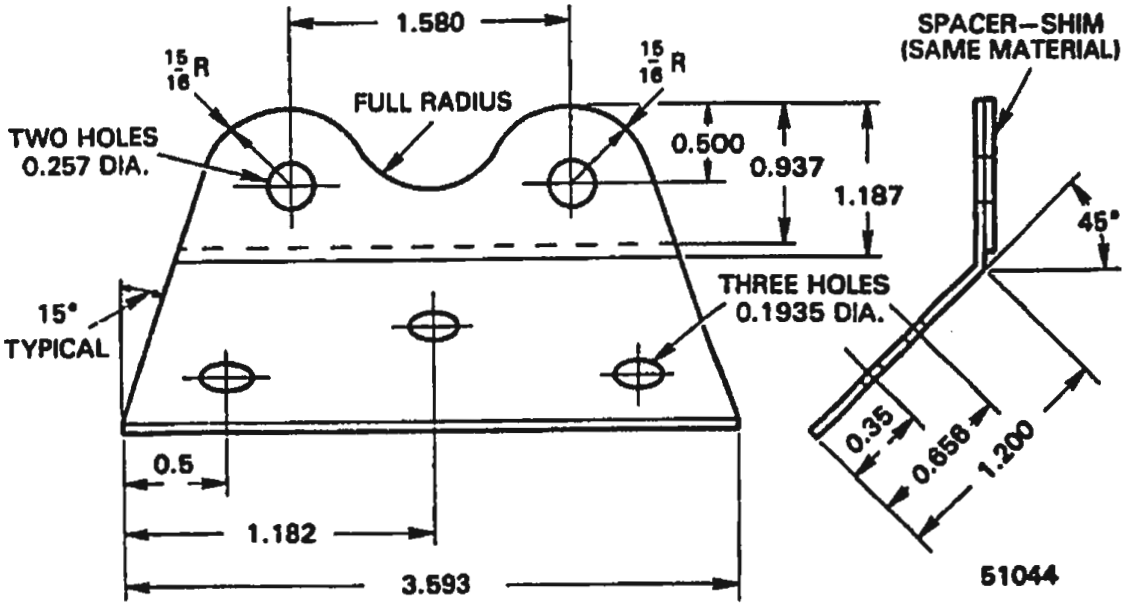
Deflector Vane Mounting Brackets
Fig.801



PREFABRICATED BRACKET
TWA Stk. Nbr. C01378-4

DEFLECTOR VANE PREFABRICATED BRACKET – POSITIONING

Material: 301 - $\frac{1}{2}$ hard, 0.080 thickness



CR CR Deflector Vane Prefabricated Mounting Bracket
Fig.803

R R 050B EFFECTIVITY: ALL

1G

HOT STREAM COLLECTOR AND NOZZLE SYSTEM DESCRIPTION AND OPERATION

Service Bulletin referred to:

S.B.78-2969	Deletion of Hot Stream Spoiler System and Introduction of 11 Degree Exhaust Collector.
S.B.78-3551	Introduction of 15 Degree Afterbody

1. General

The hot stream collector and nozzle system receives the gas efflux from the turbine. The collector directs it through the convergent propelling nozzle resulting in an increase in gas velocity.

2. Description

On engines incorporating S.B.78-2969, the system comprises an exhaust collector and nozzle (Ref. fig.1, Sheet 1), secured to the exhaust transition case, and a fairing, secured to a diaphragm and the turbine section pylon fairing (Ref. fig.2, Sheet 1), which provides a streamlined profile rearward of the turbine section fairings and turbine section pylon fairing.

On engines incorporating S.B.78-3551, the system comprises an exhaust collector and nozzle (Ref. fig.1, Sheet 2), secured to the exhaust transition case, and a fairing secured to the turbine section fairings and turbine section pylon fairing (Ref. fig.2, Sheet 2), which provides a streamlined profile rearward of the turbine section fairings and pylon fairing.

A. Exhaust Collector and Nozzle - Engines incorporating S.B.78-2969

The exhaust collector and nozzle is a single piece structure, comprising a tubular collector, an integral diaphragm and a convergent propelling nozzle. The integral diaghragm situated mid-way along the collector, provides the rear mounting land for the turbine section fairings (Ref. 72-03-00) and the mounting land for the exhaust collector fairing. Two lugs on the collector front attachment flange provide attachment points for the transportation and lifting stand. Two brackets attached to the front flange, one on each side of the engine top centre line, provide the lower attachment points for the engine lightning discharge cables.

B. Exhaust Collector and Nozzle - Engines incorporating S.B.78-3551

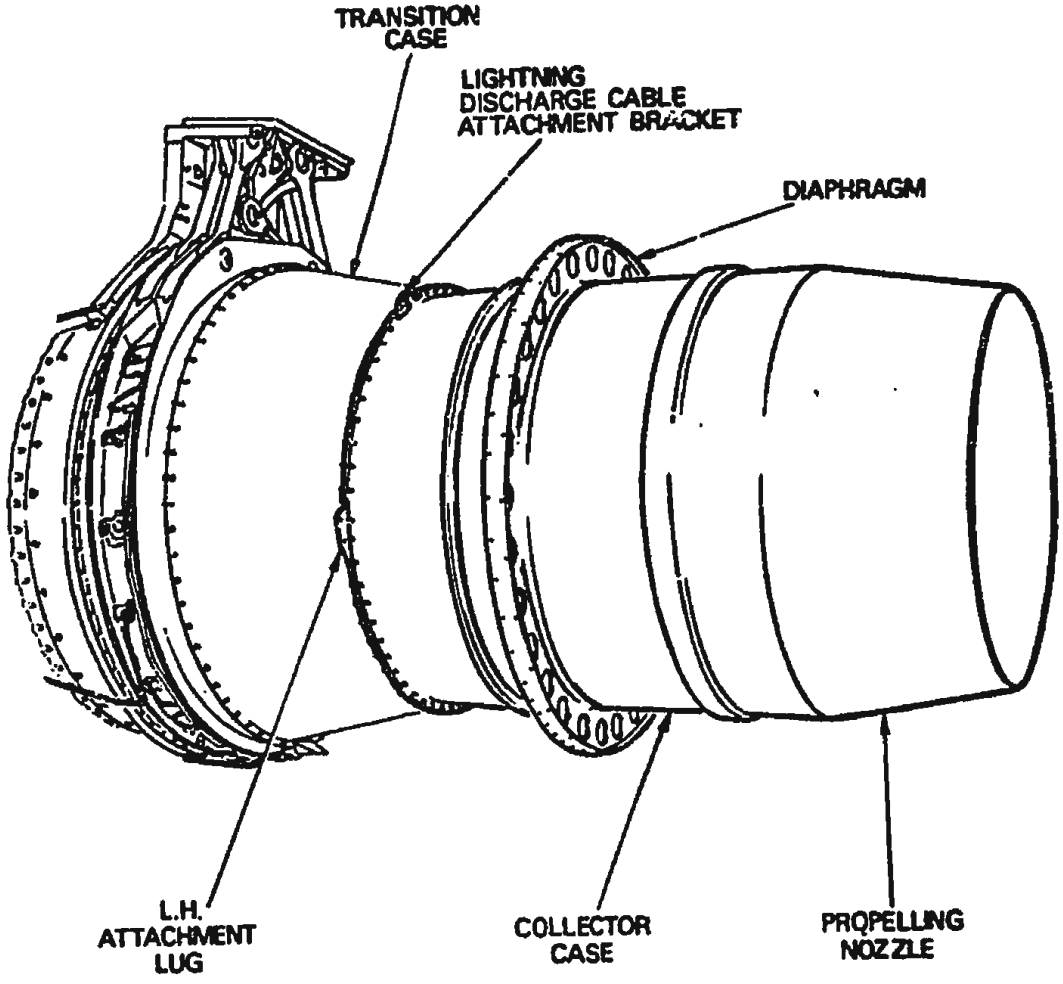
The exhaust collector and nozzle is a single piece structure, comprising a tubular collector and a convergent propelling nozzle. Four cross key support assemblies attached to the collector front flange provide location for the exhaust collector fairing. Two lugs also on the front flange provide attachment points for the lifting and transportation stand, and two brackets also attached to the front flange, one on each side of the engine top centre line, provide the lower attachment points for the engine lightning discharge cables.

C. Exhaust Collector Fairing - Engines incorporating S.B.78-2969

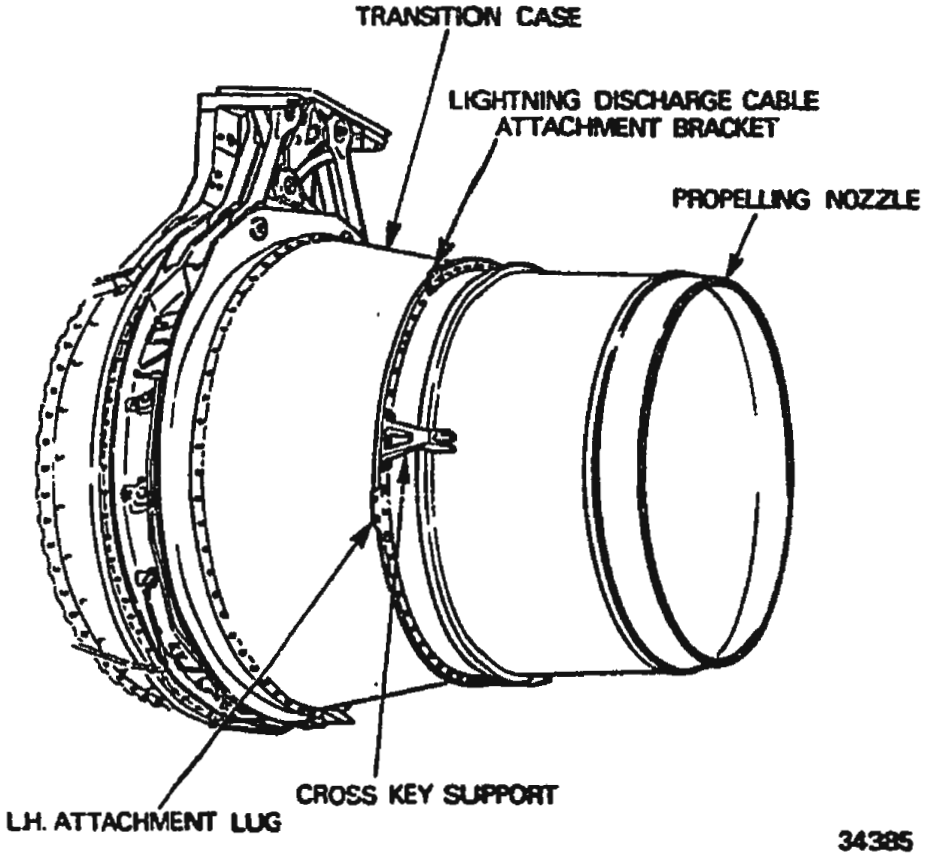
The exhaust collector fairing is of single skin construction, the upper section being titanium and the lower section being aluminium. The fairing is secured at its forward end to the diaphragm and the turbine section pylon fairing, and extends rearward as far as the convergent propelling nozzle.

D. Exhaust Collector Fairing - Engines incorporating S.B.78-3551

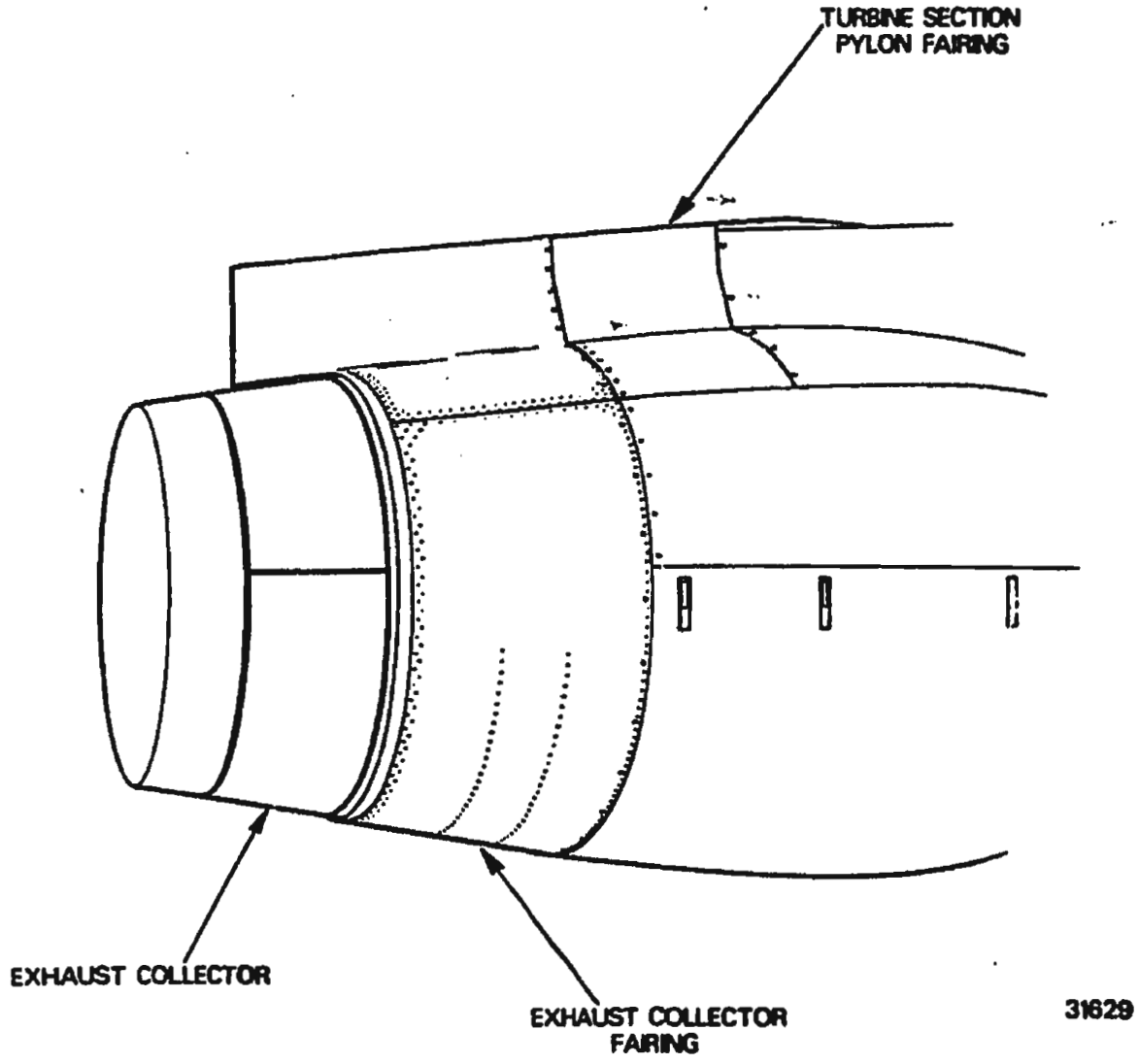
The exhaust collector fairing is of single skin construction, the upper section being titanium and the lower being aluminium. The fairing, located at its forward end in the four cross key support assemblies attached to the collector front flange, is secured to the turbine section fairings and extends rearward as far as the convergent propelling nozzle.



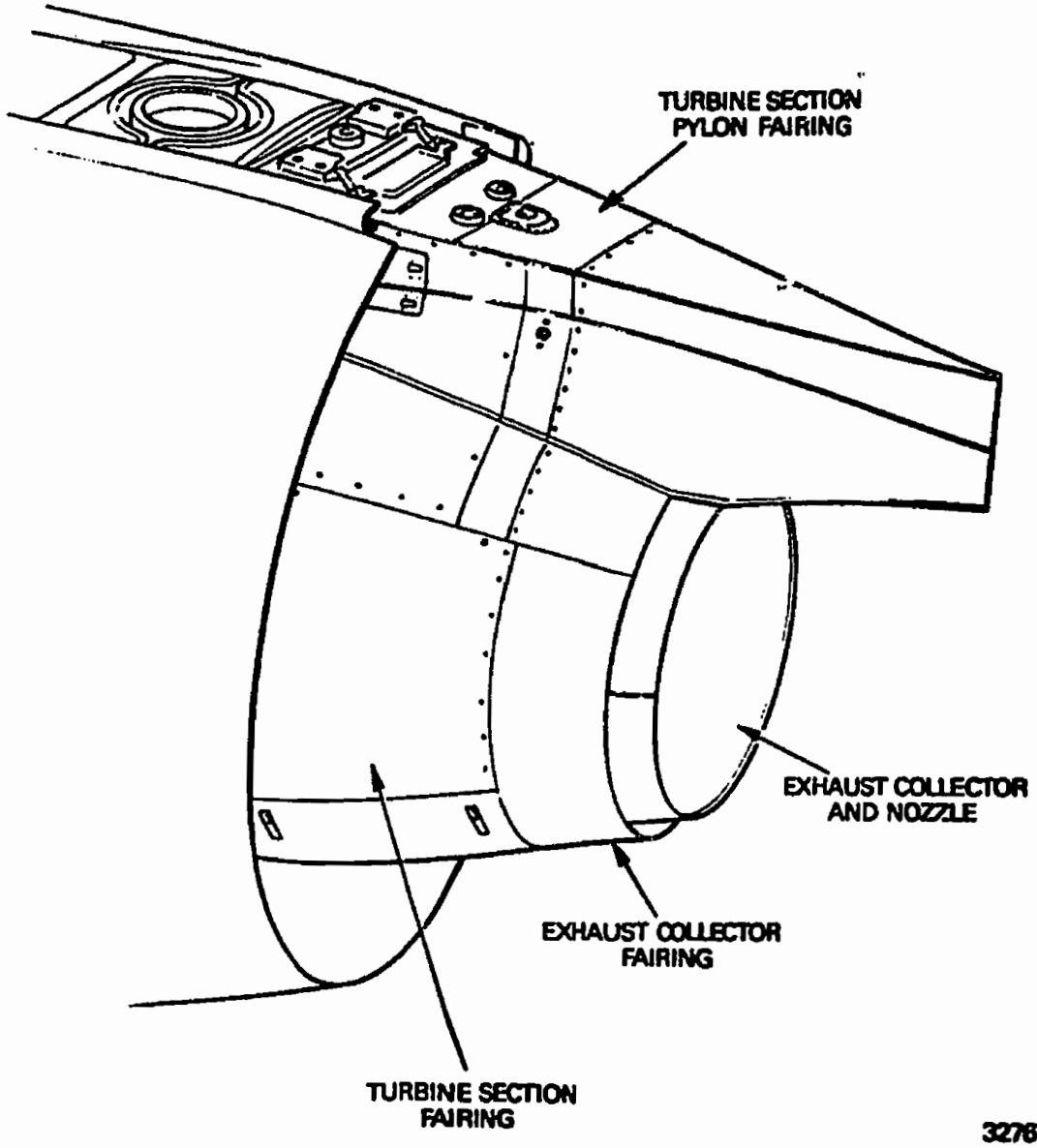
Hot stream collector and nozzle assembly
(S.B.78-2969)
Fig.1 (Sheet 1)



Hot stream collector and nozzle assembly
(S.B.78-3551)
Fig.1 (Sheet 2)



Exhaust collector fairing
(S.B.78-2969)
Fig.2 (Sheet 1)



Exhaust collector fairing
(S.B.78-3551)
Fig.2 (Sheet 2)

R # EXHAUST COLLECTOR - REMOVAL/INSTALLATION

R Service Bulletin referred to:

R S.B.78-3551 - Introduction of 15 Degree Afterbody.

R Referenced procedures:

R 54-51-54 Glove Fairing - Wing Pylon - Removal/Installation.
R 54-52-53 Glove Fairing - Centre engine - Removal/Installation.
R 72-03-00 Gas Generator Fairings - Removal/Installation.
R 78-13-02 Exhaust Collector Fairing - Removal/Installation.
R 78-30-00 Thrust Reverser - Servicing.

R Illustrated Parts Catalgoue references:

R The I.P.C. sections where parts disturbed during the following
R operations can be located are as follows:

R 78-11-00 Collector and Nozzle Installation Hot Stream System.
R 78-13-02 Exhaust Collector Fairing.

R 1. Remove Cross Key Location Support Assembly on engines
R incorporating S.B.78-3551

R A. WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN
R FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
R Deactivate and tag thrust reverser and associated systems
R and fit thrust reverser locks (Ref. 78-30-00).

R B. No.1 and No.3 engine

R (1) Remove glove fairing 453B or 463B (Ref. 54-51-54).

R C. No.2 engine

R (1) Remove glove fairing 472C (Ref. 54-52-53).

R D. Remove turbine section gas generator fairings
R (Ref. 72-03-00).

R E. Remove exhaust collector fairing (Ref. 78-13-02).

R F. Refer to fig.401, remove nuts and bolts (1) and slide cross key location support assembly (2) rearwards to disengage locating pin (3) from exhaust collector assembly stiffener (4). Remove cross key location support assembly.

R 2. Install Cross Key Location Support Assembly on engines incorporating S.B.78-3551

R A. Ensure thrust reverser and associated systems are deactivated and tagged as detailed in operation 1.A.

R B. Refer to fig.401, position cross key location support assembly (2) on exhaust collector assembly stiffener (4). Align locating pin (3) with stiffener location hole and push cross key location support assembly fully home.

R C. CAUTION: IN ORDER TO AVOID DAMAGE TO LOCATING PIN (3), DO NOT APPLY FORCE TO ALIGN CROSS KEY LOCATION SUPPORT ASSEMBLY (2) BOLT HOLES WITH EXHAUST COLLECTOR ASSEMBLY FLANGE (5) AND TRANSITION CASE FLANGE (6) BOLT HOLES.

Align cross key location support assembly (2) bolt holes with exhaust collector assembly flange (5) and transition case flange (6) bolt holes then fit and secure nuts and bolts (1).

R D. Install exhaust collector fairing (Ref. 78-13-02).

R E. Install turbine section gas generator fairings (Ref. 72-03-00).

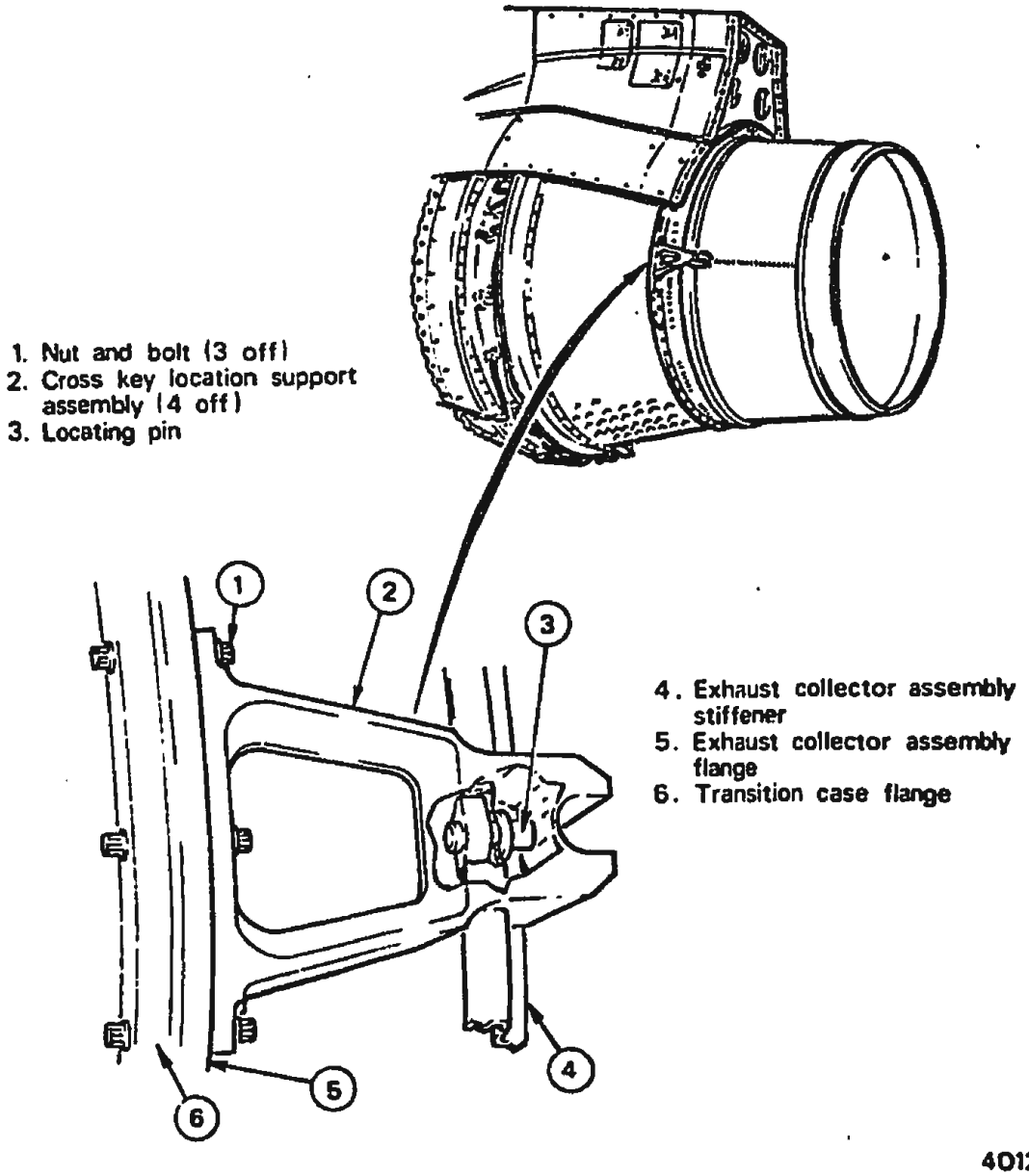
R F. No.1 and No.3 engine

R (1) Install glove fairing 453B or 463B (Ref. 54-51-54).

R G. No.2 engine

R (1) Install glove fairing 472C (Ref. 54-52-53).

R H. Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00).


1. Nut and bolt (3 off)
2. Cross key location support assembly (4 off)
3. Locating pin
4. Exhaust collector assembly stiffener
5. Exhaust collector assembly flange
6. Transition case flange
40121

R Cross key location support assembly - Removal/Installation
R (S.B.78-3551)
R Fig.401

R EFFECTIVITY: ALL
R

EXHAUST COLLECTOR - INSPECTION/CHECK

1. Inspect Exhaust Collector

Referenced Procedures:

72-03-00	Gas Generator Fairings - Removal/Installation
78-30-00	Thrust Reverser - Servicing
78-13-02	Exhaust Collector Fairing - Removal/Installation

A. Inspection

(1) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00).

(2) Remove turbine section lower fairing (Ref. 72-03-00).

(3) Remove turbine section L.H. and R.H. side fairings (Ref. 72-03-00).

(4) Remove pylon L.H. and R.H. rear access panels (Ref. 72-03-00).

(5) Remove exhaust collector fairing (Ref. 78-13-02)

(6) Inspect exhaust collector for cracks, nicks or scores and dents. For acceptance standards see 1.B.

(7) Inspect exhaust collector front flange for cracks and distortion. For acceptance standards see 1.B.

C (8) Deleted

(9) Fit exhaust collector fairing (Ref. 78-13-02)

(10) Fit pylon L.H. and R.H. rear access panels (Ref. 72-03-00).

(11) Fit turbine section L.H. and R.H. side fairings (Ref. 72-03-00).

(12) Fit turbine section lower fairing (Ref. 72-03-00).

(13) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00).

B. Acceptance Standards - see fig.601

(1) Exhaust collector

C CR R Holes are not acceptable. Heat produced buckling or distortion is acceptable. Cracks are acceptable as follows:

Damage within the following limitations is acceptable

C (a) Cracks not exceeding 3.0in. (76,2 mm.) in length.

C C C C C (b) Cracks that extend beyond limits in para.(a) but not exceeding 8.0in. (203,2 mm.) - inspect every 10 hours. If cracks exceed 8.0in., the exhaust collector should be repaired or replaced within 8 hours flight time.

C (c) All cracks are to be repaired at Check 'C'.

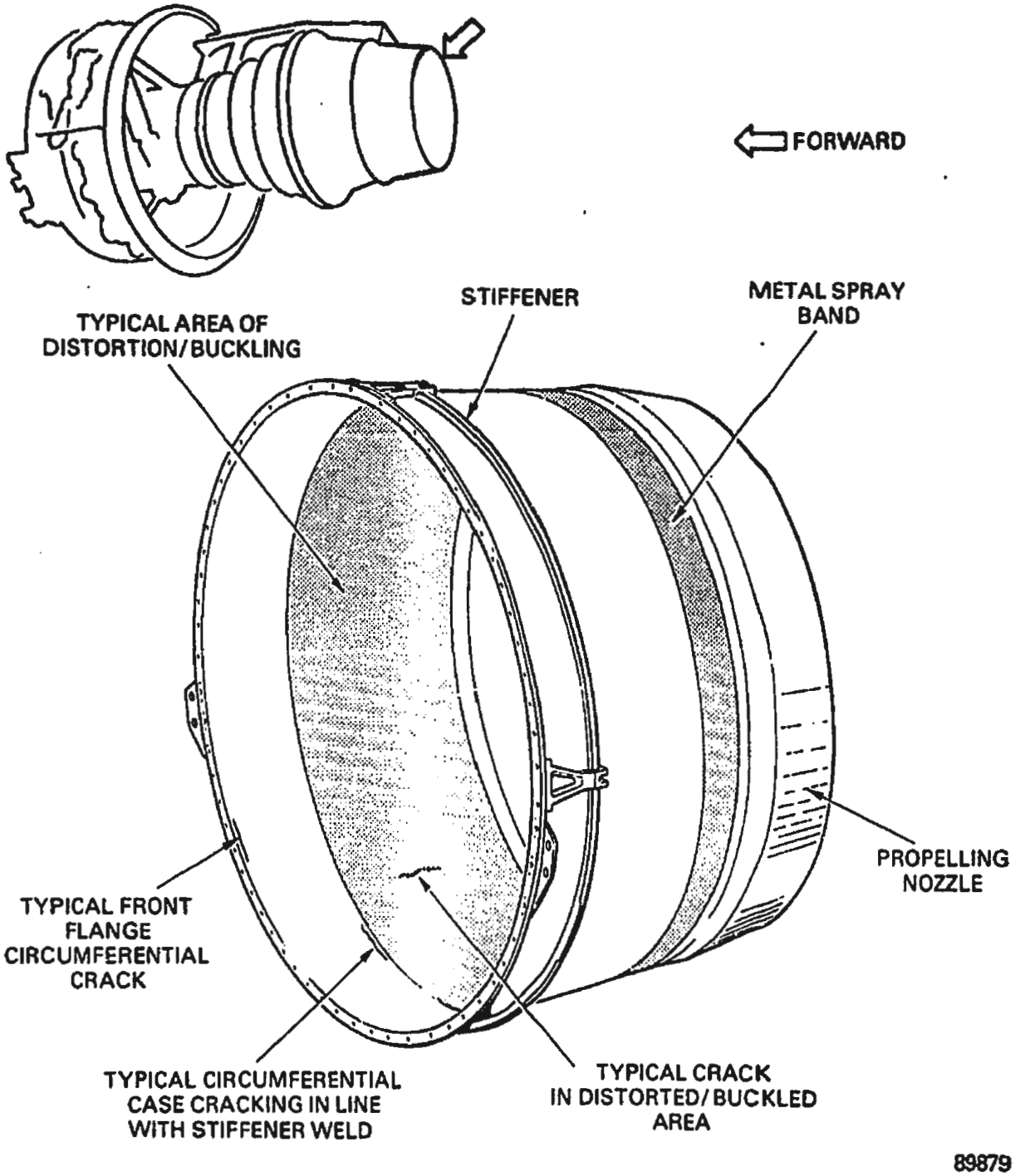
(2) Exhaust collector front flange - 'Fly-on' limits

C C C (a) Three cracks up to 3.00in. (76,2 mm.) long are acceptable provided each crack is separated by 6.00in. of material.

C (b) All cracks are to be repaired at Check 'C'.

C (3) Deleted

C (4) Deleted



Exhaust Collector - Inspection/Check
Fig.601

EXHAUST COLLECTOR ASSEMBLY -

LIST OF REPAIRS

Repair No.	Title	Page No.
FRS.3826	Exhaust collector assembly - Repair by direct welding or patching.	803
FRS.3874	Exhaust collector assembly - Repair skin by fitting a patch secured by rivets.	811

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EXHAUST COLLECTOR ASSEMBLY -
REPAIR BY DIRECT WELDING OR PATCHING
FRS.3826

1. Effectivity

I.P.C. Fig./Item	Part No.	
01 100	LJ.30748	S.B.78-2969

2. Instructions

CAUTION: BEFORE WELDING ENSURE ADEQUATE FIRE PRECAUTIONS HAVE BEEN TAKEN.

Apply these instructions in conjunction with 70-42-19 Captive nuts - Replacement of damaged or loose captive nuts.

A. Planish to remove distortion

	Procedure	Supplementary Information
(1)	Locally remove anchor nuts adjacent to distortion.	
(2)	Planish to remove distortion	
(3)	Inspect	See fig.801 and 802
(4)	Refit or renew anchor nuts	(Ref. 70-42-19)

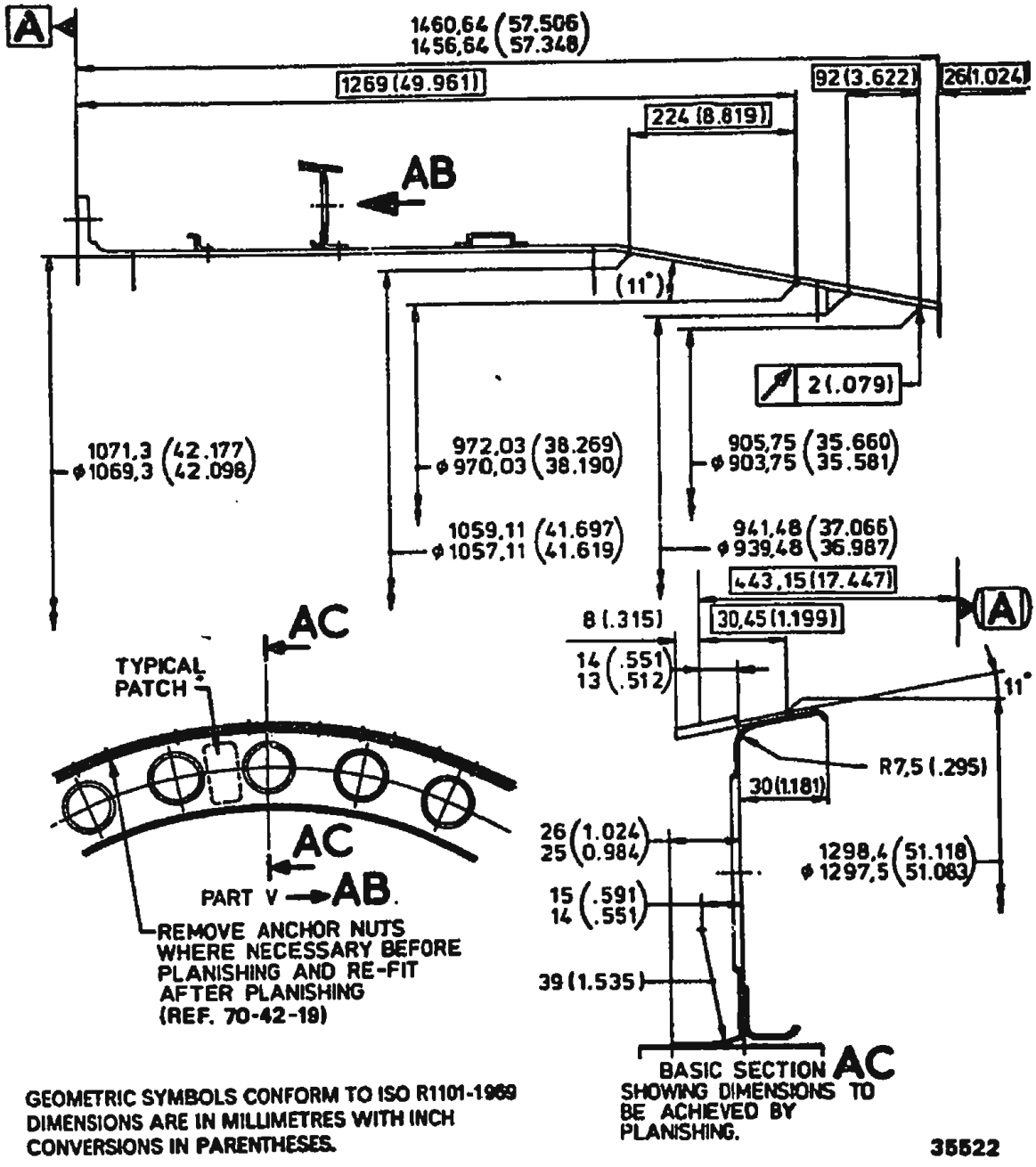
B. Direct weld cracks

	Procedure	Supplementary Information
(1)	Crack test	Identify full extent of cracking and mark.

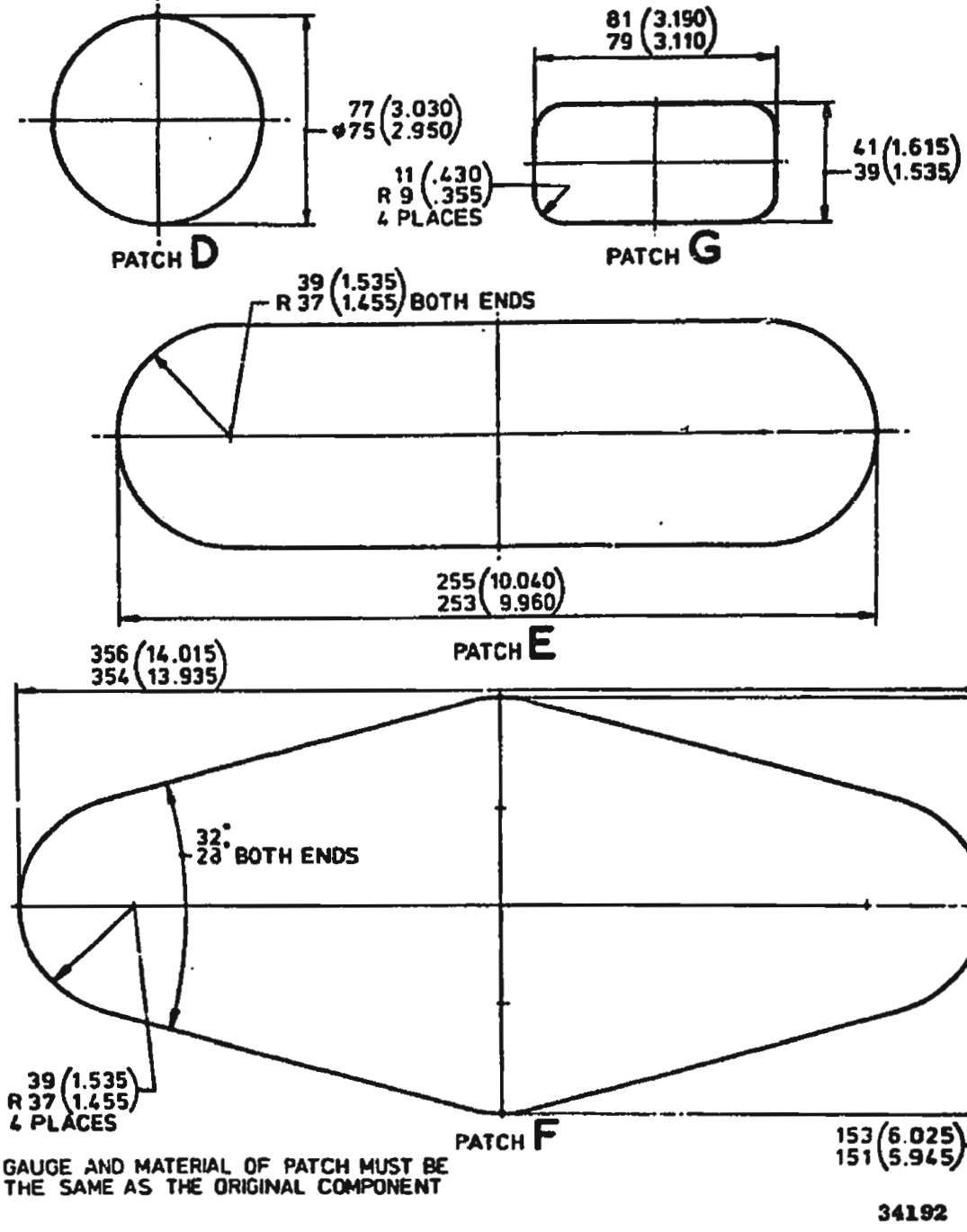
Procedure	Supplementary Information
(2) Vee out crack to approximately half metal thickness	Tool: Air driven grind stone or carbide cutter.
(3) Dress weld area in preparation for welding	See fig.803 Ensure metal thickness is not reduced below minimum dimensions.
(4) Cold liquid degrease weld area	T.S.D.594, O.P.101
(5) Tack weld cracks at 12mm. (0.500in.) intervals and then complete weld	See 4. Welding data
(6) Visually inspect for distortion	Twist or distortion, correct as described in 2.A.
(7) Crack test	
(8) Vibro-engrave FRS.3826/1 adjacent to part number	

C. Fit butt welded patches

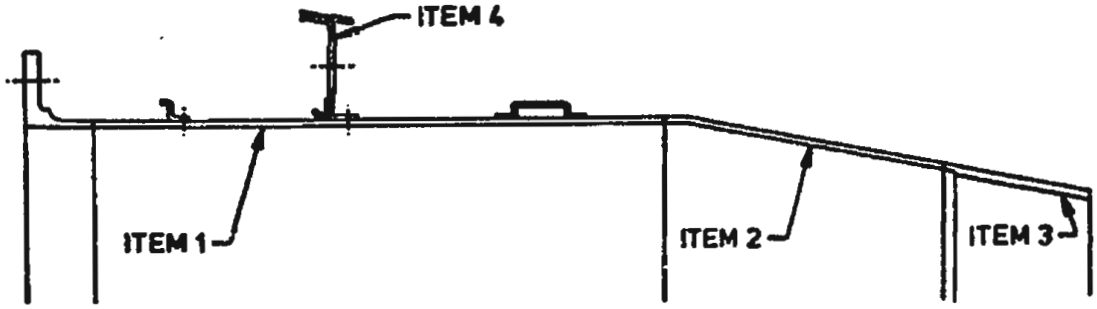
Procedure	Supplementary Information
(1) Crack test	Identify full extent of cracking and mark
(2) Produce a patch with a minimum corner radius of 9mm. (0.355in.)	See fig.802 for patch configuration Patch shape will be dependant on length of crack. Patches E and F must be fitted with their longest dimension in a circumferential direction.



Repair dimensions
Fig.801



Patch configuration
Fig.802



	MATERIAL	STOCK THICKNESS BEFORE FORMING	STOCK THICKNESS MIN. AFTER FORMING
ITEM 1	EBM MSRR 6523	0,78 (.031) 0,60 (.024)	0,54 (.022)
ITEM 2	EBM MSRR 6523	0,78 (.031) 0,60 (.024)	0,54 (.022)
ITEM 3	EBM MSRR 6523	2,75 (.110) 2,42 (.097)	2,18 (.087)
ITEM 4	EBM MSRR 6523	1,0 (.040) 0,8 (.032)	0,72 (.029)

34193

Thickness dimensions
Fig.803

Procedure	Supplementary Information
(3) Cut out an area to suit patch and trim both parts to obtain a good fit	
(4) Dress weld area on both parts in preparation for welding	Ensure metal thickness is not reduced below minimum dimension See fig.803
(5) Cold liquid degrease weld area on both parts	T.S.D.594, O.P.101
(6) Tack weld patch in position at 12mm. (0.500in.) intervals and then complete weld	See 4. Welding Data
(7) Crack test	
(8) Visually inspect for distortion	Twist or distortion, correct as described in 2.A.
(9) Vibro-engrave FRS.3826/2 adjacent to part number	

3. Material of components

	R.R. Symbol	Material
Exhaust collector	EBM	18/8 Stainless Steel

4. Welding data

Type of welding	Argonarc D.C. output
Torch	B.O.C. W200 or any 200 amp. capacity water cooled equivalent
Electrode	Thoriated tungsten, 0.062in. diameter

Filler rod	EBM (18 S.W.G. or 20 S.W.G. (0.048in. or 0.036in.) diameter) Rolls-Royce reference MS 950/2 (OMat 306)
Current	To be determined by Operator
Argon flow	Torch: 15 to 20 CFH Backing: 6 to 8 CFH

This data is given for guidance only. For further information refer to T.S.D.594, O.P.409.

5. Tools

Special tools are not required.

6. Parts

A. Parts required

I.P.C. Fig./Item	Part No.	Description
	BR.45320	Patch Material EBM Thickness: 0,71mm. (0.028in.) Material size: 609mm. x 609mm. (24.000in. x 24.000in.)
	LK.62914	Patch Material EBM Thickness: 2,64 mm. (0.104in.) Material size: 305mm. x 305mm. (12.000in. x 12.000in.)
	CU.31868	Patch Material EBM Thickness: 0,91mm. (0.036in.) Material size: 305mm. x 305mm. (12.000in. x 12.000in.)

7. Price and Availability

Parts)
) Refer to Rolls-Royce (1971) Limited
Repair of spares)

EXHAUST COLLECTOR ASSEMBLY - REPAIR SKIN BY FITTING A PATCH SECURED BY RIVETS

FRS.3874

This repair covers the application of a temporary patch secured by steel rivets when the collector skin has cracked and facilities are not available to fit a butt welded patch in accordance with FRS.3826.

1. Effectivity

I.P.C. Fig./Item	Part No.
01 100	LJ.30748 S.B.78-2969

2. General

Use suitable rivets of 3,175 mm. (0.125in.) diameter from the AS.16000 or CR.2539 range or alternatively use NAS.508M4 rivets.

Hole and chamfer details are to be in accordance with the manufacturers data for the rivet used.

This scheme must not be used to fit a patch in any area other than that designated on fig.804.

3. Instructions

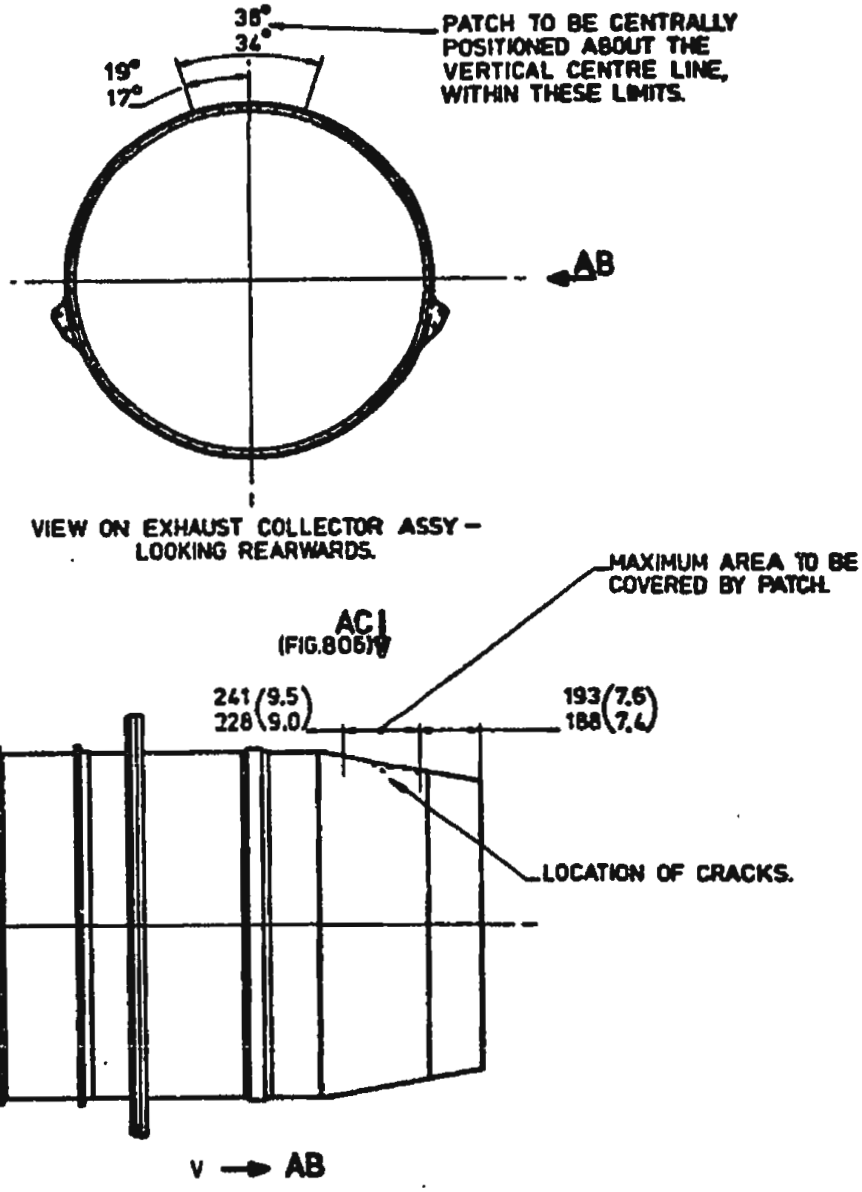
A. Make and locate patch

Procedure	Supplementary Information
(1) Cut and form patch materials to cover damaged area	See fig.804 and 805

Procedure	Supplementary Information
(2) Apply patch to damaged area and scribe around profile.	See fig.804 Ensure patch is positioned centrally over damaged area
(3) Dress out the damaged material	See fig.805
(4) Mark out patch for rivet holes	See fig.805
(5) Place the patch on collector skin and align to previously scribed lines	
(6) Drill rivet holes	See fig.805 Use Hand Tools
(7) Remove patch.	
(8) Chamfer and de-burr holes	

B. Fit patch to Exhaust collector

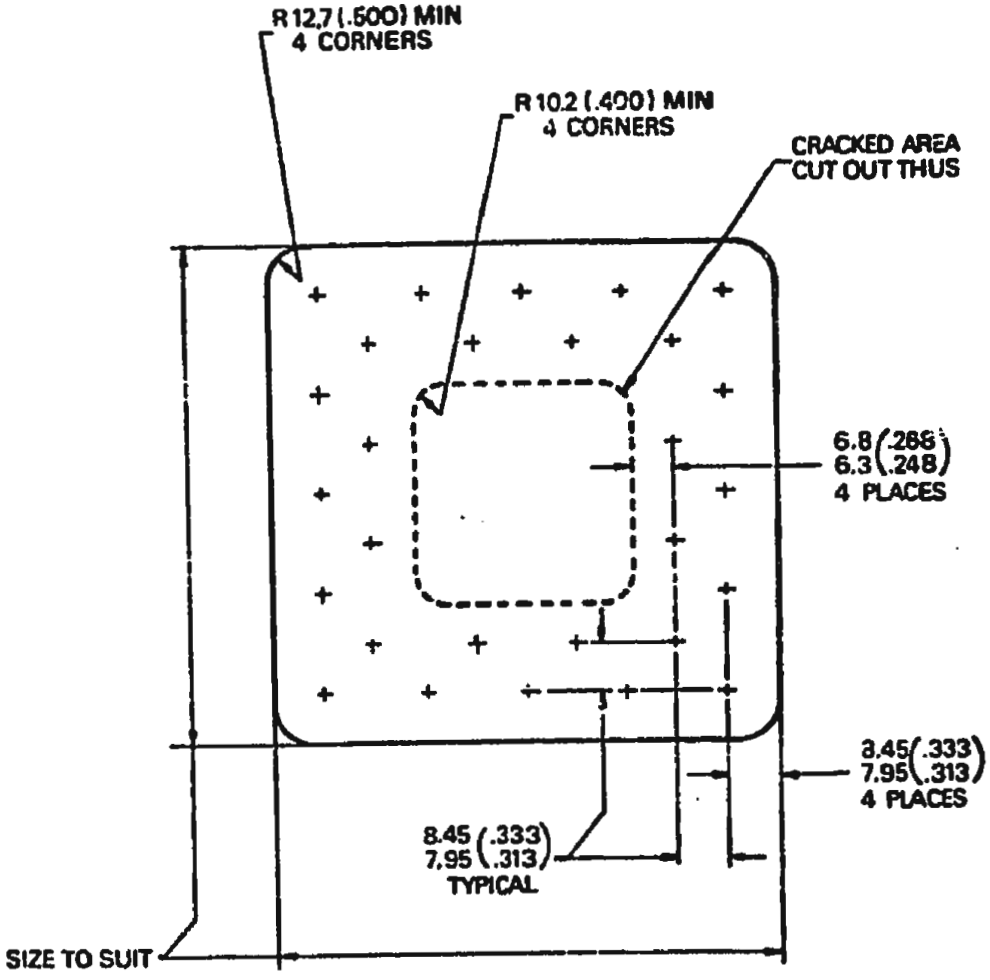
Procedure	Supplementary Information
(1) Assemble the patch in position on the collector and rivet in position	See fig.804 and 805 If accessibility is restricted use the CR.2539 series rivets otherwise the plain rivets may be used.
(2) Visually inspect	
(3) Vibro-engrave FRS.3874 adjacent to part number.	



DIMENSIONS ARE IN MILLIMETRES WITH INCH CONVERSIONS IN PARENTHESES.

35523

Repair location and dimensions
Fig.804



V → AC (FIG.804)
SHOWING RIVETTING OF TYPICAL PATCH

35205

Patch details and dimensions
Fig.805

4. Material of Components

Description	R.R. Symbol	Material
Exhaust collector	EBM	18/8 Stainless Steel

5. Parts

A. Parts required

I.P.C. Fig./Item	Part No.	Description
	EU.27167	Patch (18 S.W.G.) 304,8 mm. (12in.) x 304,8 mm. (12in.)
	AS.16086	Rivet, solid, universal head
	OR	
	3408462	Cherrylock rivet, blind, CR.235-4-2.

6. Tools

Special tools are not required.

7. Prices and Availability

Engine parts)
Repair of spares) Refer to Rolls-Royce (1971) Limited

EXHAUST COLLECTOR FAIRING - REMOVAL/INSTALLATION

Service Bulletins referred to:

S.B.78-2969 - Deletion of Hot Stream Spoiler and Introduction of 11 Degree Afterbody
S.B.78-3551 - Introduction of 15 Degree Afterbody

R 1. Remove Exhaust Collector Fairing - Engines incorporating S.B.78-2969

CAUTION: THE WEIGHT OF THE EXHAUST COLLECTOR FAIRING IS 60LB. (27 KG)

Referenced Procedures:

54-51-54	Glove Fairing - Wing Pylon - Removal/Installation
54-52-53	Glove Fairing - Centre Engine - Removal/Installation
78-30-00	Thrust Reverser - Servicing

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

78-13-02 Exhaust Collector Fairing

R A. WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS. Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref. 78-30-00).

R B. Remove glove fairing, 543B or 463B for engines No.1 and 3 (Ref. 54-51-54) or 472C for engine No.2 (Ref. 54-52-53).

R C. Refer to fig.401, remove bolts (1) and screws (2).

R D. Withdraw fairing (3) rearwards from exhaust collector.

R 2. Install Exhaust Collector Fairing - Engines incorporating
R S.B.78-2969

R A. Ensure thrust reverser is locked and systems are
R deactivated and tagged as detailed in operation 1.A.

R B. Refer to fig.401, position fairing (3) over exhaust collector, fit and secure screws (2) and bolts (1).

R C. Fit glove fiaring, 453B or 463B for engines No.1 and 3 (Ref. 54-51-54) or 472C for engine No.2 (Ref. 54-52-53).

R D. Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00).

R 3. Remove Exhaust Collector Fairing - Engines incorporating S.B.78-3551

CAUTION: THE WEIGHT OF THE EXHAUST COLLECTOR FAIRING IS APPROXIMATELY 71LB. (32,2 KG.).

Referenced Procedures:

	54-51-54	Glove Fairing - Wing Pylon - Removal/Installation
	54-52-53	Glove Fairing - Centre Engine - Removal/ Installation
	72-03-00	Gas Generator Fairings - Removal/Installation
R	78-13-01	Exhaust Collector - Removal/Installation
	78-30-00	Thrust Reverser - Servicing

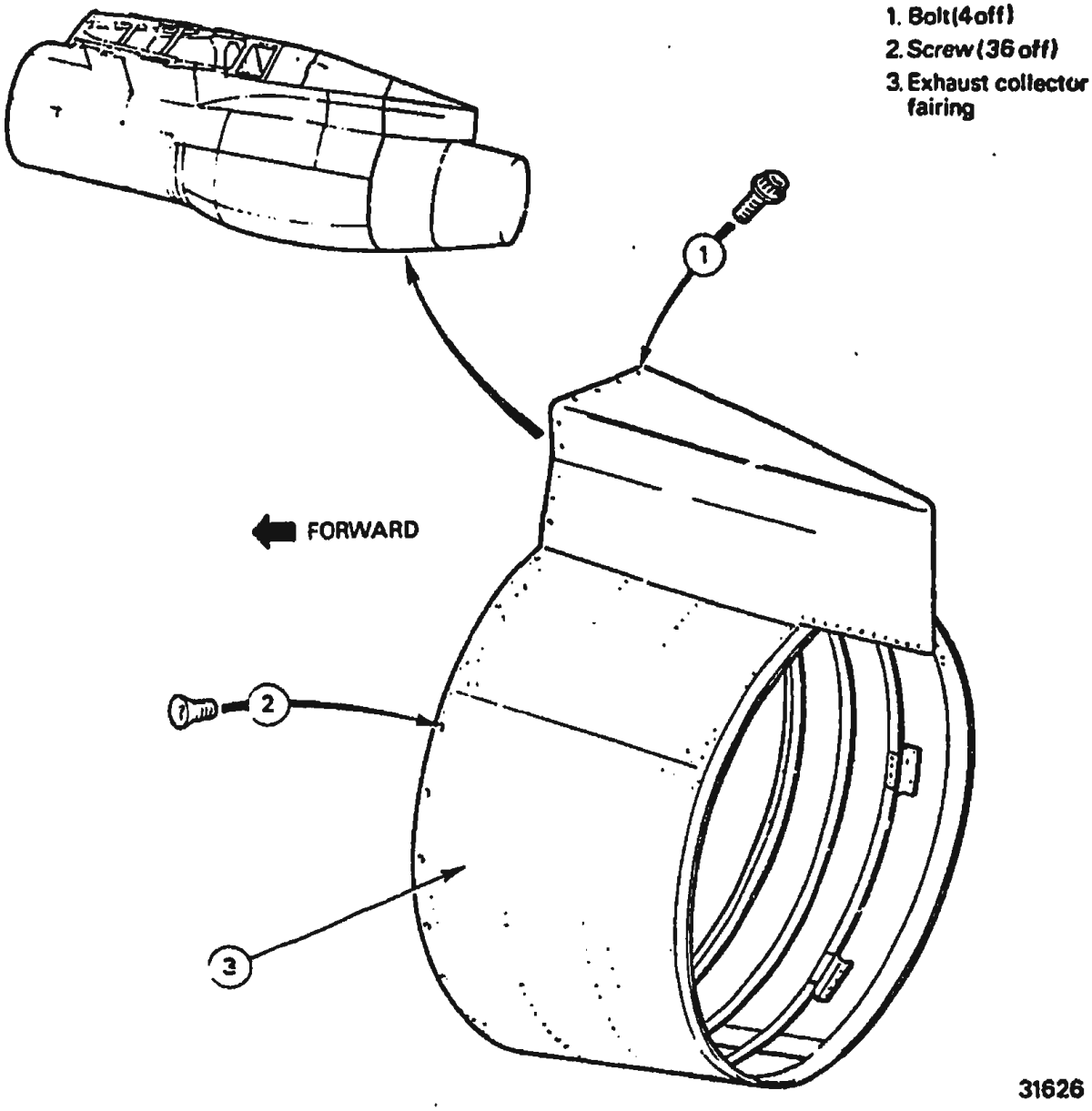
R A. WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref.78-30-00).

R B. Remove glove fairing 453B or 463B for engine No.1 and 3 (Ref. 54-51-54) or 472C for engine No.2 (54-52-53).

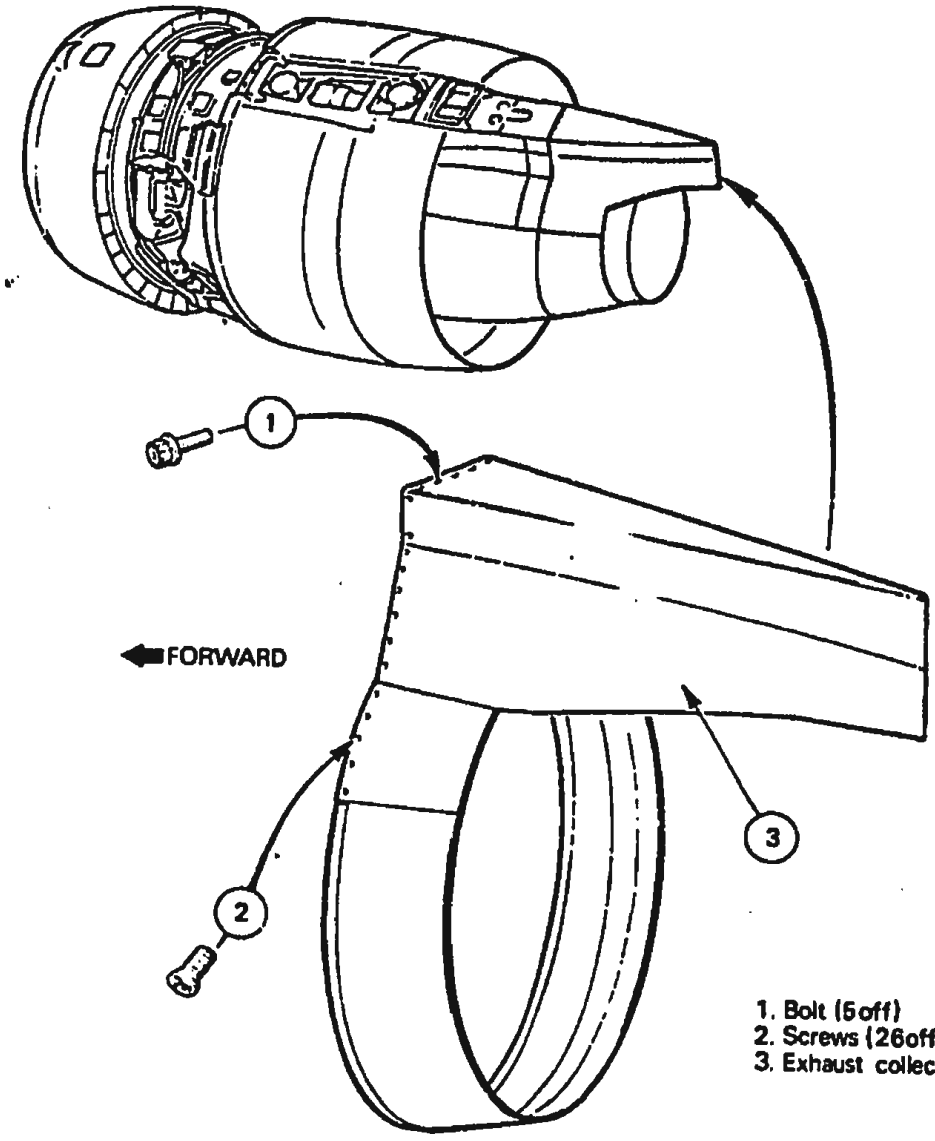
R C. Remove turbine section gas generator fairings (Ref. 72-03-00).

R D. Refer to fig.402, remove screws (2) and bolts (1).

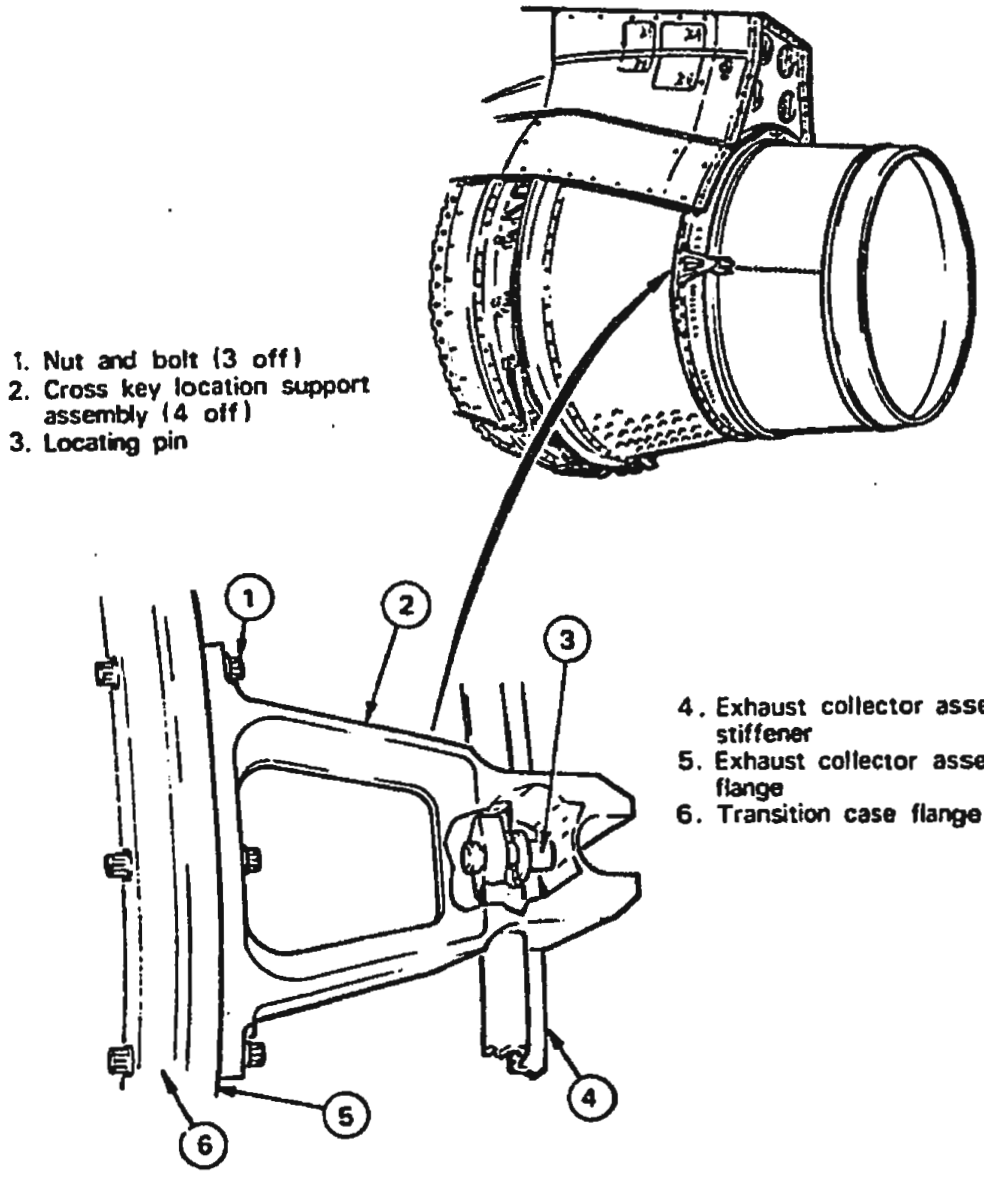
R E. Withdraw fairing (3) rearwards from exhaust collector.



Exhaust collector fairing - Removal/Installation
(S.B.78-2969)
Fig.401



Exhaust collector fairing - Removal/Installation
(S.B.78-3551)
Fig.402



R Cross key location support assembly - Inspection/Check
R (S.B.78-3551)
R Fig.403

R EFFECTIVITY: ALL

R F. Refer to fig.403, at four positions, check cross key
R location support assembly locating pin (3) for damage or
R security. If location pin is loose or damaged, remove
R cross key location support assembly (2) (Ref. 78-13-01)
R and replace by a new assembly.

R 4. Install Exhaust Collector Fairing - Engines incorporating
R S.B.78-3551

R A. Ensure thrust reverser and associated systems are
R deactivated and tagged as detailed in operation 3.A.

R B. Refer to fig.402, position fairing (3) over exhaust collector, ensuring correct location in four cross key
R location support assemblies (2) (fig.403).

R C. Refer to fig.402, fit and secure screws (2) and bolts (1).

R D. Fit turbine section gas generator fairings (Ref. 72-03-00).

R E. Fit glove fairings 453B or 463B for engines No.1 and 3 (Ref 54-51-54) or 472C for engine No.2 (Ref. 54-52-53).

R F. Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00).

EXHAUST COLLECTOR FAIRING - INSPECTION/CHECK (S.B.78-2969 or S.B.78-3551)

1. Inspect Exhaust Collector Fairing

Service Bulletins referred to:

S.B.78-2969 Deletion of Hot Stream Spoiler and Introduction of 11 Degree Afterbody
S.B.78-3551 Introduction of 15 Degree Afterbody

Referenced Procedures:

54-51-54 Glove Fairing - Wing Pylon - Removal/Installation
54-52-53 Glove Fairing - Centre Engine - Removal/Installation
78-30-00 Thrust Reverser - Servicing

A. Inspection

(1) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00).

(2) Remove glove fairing, 453B or 463B for engines No.1 or 3 (Ref. 54-51-54) or 472C for engine No.2 (Ref. 54-52-53).

(3) Refer to fig.601 (Sheet 1 or 2), inspect titanium skin for cracks, nicks or scores and dents. For acceptance standards see 1.B.

(4) Inspect aluminium skin for cracks, nicks or scores and dents. For acceptance standards see 1.B.

(5) Inspect rear ring for cracks and distortion. For acceptance standards see 1.B.

(6) Fit glove fairing, 453B or 463B for engines No.1 and 3 (Ref. 54-51-54) or 472C for engine No.2 (Ref. 54-52-53).

(7) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00).

B. Acceptance Standards

(1) Titanium skin

Cracks are not acceptable.

Damage within the following limitations is acceptable.

(a) Nicks or scores not exceeding 0.005in. (0,127 mm.) in depth, 2.00in. (50,8 mm.) in length with a minimum distance of 4.00in. (101,6 mm.) between individual areas of damage.

(b) Smooth, round-bottomed dents not exceeding 0.20in. (5,08 mm.) in depth and 3.00in.(76,2 mm.) in diameter.

(2) Aluminium skin

(a) Cracks up to 1.00in. (25,4 mm.) in length providing they are stop drilled with a 0.1875in. (4,7625 mm.) diameter hole at crack extremities.

CR (b) Nicks and scores not exceeding 0.015in. (0,381 mm.)
CR in depth, 6.00in. (152,4 mm.) in length with a
CR minimum distance of 1.00in. (25,4 mm.) between individual areas of damage.

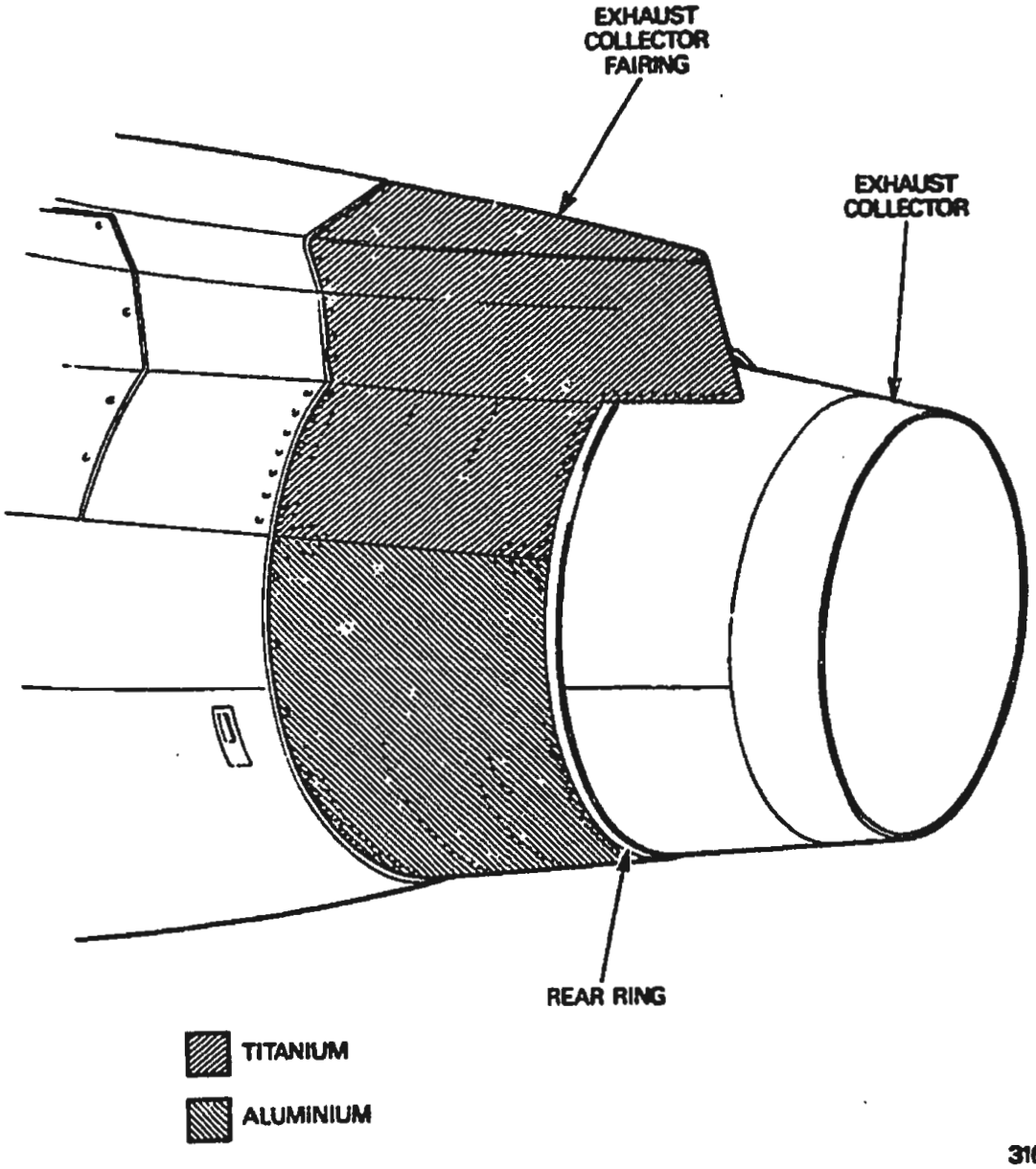
(c) Smooth, round-bottomed dents not exceeding 0.20in. (5,08 mm.) in depth and 4.00in. (101,6 mm.) in diameter.

(3) Rear ring

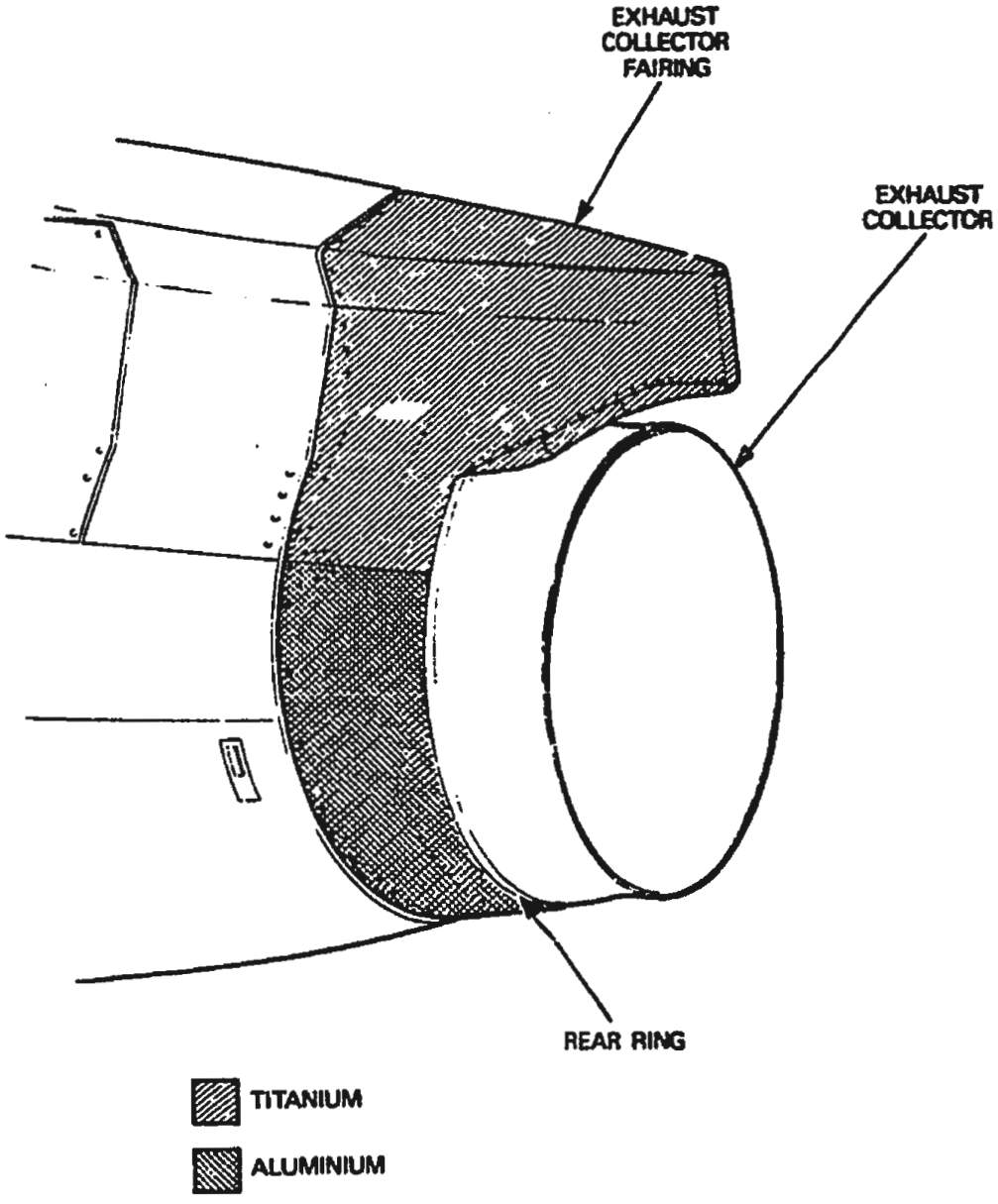
Cracks are not acceptable.

Damage within the following limitations is acceptable.

(a) Circumferential distortion up to 0.20in. (5,08 mm.) in depth, 6.00in. (152,4 mm.) in length with a minimum distance of 4.00in. (101,5 mm.) between areas of distortion.



Exhaust collector fairing inspection/check
(S.B.78-2969)
Fig.601 (Sheet 1)



Exhaust collector fairing inspection/check
(S.B.78-3551)
Fig.601 (Sheet 2)

THRUST REVERSER - DESCRIPTION AND OPERATION

1. General

A thrust reverser is incorporated in the exhaust system of each engine to assist aircraft deceleration after landing. The thrust reverser utilizes engine power as a deceleration force by reversing the direction of the cold (by-pass) stream, which constitutes the major proportion of the overall thrust of the engine.

To provide ease of access the illustrations referred to in the following text are grouped at the end of the section.

Service Bulletins referred to:

S.B.78-3571 - Introduction of Pressure Regulator Remote Deactivation
S.B.78-3608 - Introduction of Detachable Cowl Lock Indication Housings and Provision for Reverser Locking Out/Manual Wind Features.
S.B.78-3753 - Introduction of Positive Indication of a Stowed and Locked Translating Cowl.
AiResearch S.B.121186-78-1172 - Translating Cowl Gearboxes - Introduction of Locking and Manual Drive Facility.
S.B.78-5704 - Exhaust - Air Motor - Deletion of Topping Speed Control.
R S.B.78-8089 - Air Motor - Exhaust - Deletion of Stow Logic
R Valve.

2. Description

The cold stream reverser (zone 415, 425 and 435) is secured to the L.P. compressor case rear flange and is an integral part of the cold stream duct and nozzle. It is an annular outlet type with fixed deflector vanes. In the forward thrust configuration the vanes are blanked off externally by a translating section of outer cowl and internally by blocker flaps forming part of the cold stream duct. In the reverse thrust configuration the cowl and blocker flaps translate rearward exposing the deflector vanes. At the same time, the blocker flaps fold inward to blank off the cold stream duct downstream of the reverser and divert the gas flow through the deflector vanes.

The thrust reverser system is actuated by an air motor unit (fig.3) mounted above the exhaust transition case. The unit comprises a gear type motor, with an integral control system. Air motor output is transmitted through a series of flexible drives, speed reducing gearboxes and screwjacks to the cold stream reverser. Motive power for operation of the air motor is H.P. compressor delivery air ducted from the engine air off-take system (Ref. 75-00-00). The airflow is maintained at a predetermined pressure, or completely shut off, by a solenoid operated pressure regulating and shut-off valve (P.R.S.O.V.) energized by a throttle lever microswitch in conjunction with an air/ground sensing system (fig.1 and 5).

Reverse thrust is selected at the flight station (zone 210) by moving the reverse thrust select lever attached to the engine throttle lever upward and rearward to reverse idle. Engine power is then controlled by reverse thrust select lever movement in conjunction with the fuel system (Ref. 73-21-00). A mechanical baulk connected through a feedback linkage (Ref. 76-11-00) to the translating cowl upper left-hand (feedback) gearbox, restricts any increase in engine power beyond reverse idle until the reverser has reached its rearward mid-travel position. After that position, the baulk is progressively removed allowing engine power to be increased.

Forward thrust is selected by moving the reverse thrust select lever forward and downward to forward idle, returning the control of engine power to the throttle lever. The mechanical baulk restricts engine power to idle for the initial 25 per cent of reverser forward travel, after which the feedback linkage progressively removes the baulk allowing engine power to be increased.

In addition, should any malfunction cause the reverser to move away from its selected position, the mechanical baulk will wind back the throttle lever or reverse thrust select lever to the idle position.

The normal air supply for operating the thrust reverser system is ducted from the H.P. air off-take (fig.5) of the appropriate engine. For ground servicing, the system may also be operated using alternative sources of H.P. air, i.e. aircraft Auxiliary Power Unit (A.P.U.), an external air supply fed through the high pressure ground connectors, or by cross-bleeding from a running engine. The distribution of air from these sources is described in Chapter 36-00-00.

For system operation using one of the alternative sources, an APU/GND AIR TO REVERSER switch is located on the pilot's control console. This energizes a circuit to open the engine isolation valve (Ref. 36-11-00) and allow air flow through the H.P. air duct in the reverse direction.

Proximity type sensors provide flight station indication of translating cowl unlocked/not stowed and translating cowl extended. A proximity type pressure switch provides flight station indication of pressure downstream of the P.R.S.O.V., indicating the valve is open.

A. Cold Stream Reverser (Fig.7)

The cold stream reverser is secured to the L.P. compressor case rear flange and is an integral part of the cold stream duct. It is an annular outlet type comprising the following units:

(1) Cold Stream Reverser Case

The reverser case is 'C' shaped to clear the interservices fairing, a hoop plate (Ref. 72-03-00) being bolted across the top to complete the ring. Six longitudinal, channel sectioned beams extend between the front and rear rings of the case and provide mountings for the translating cowl actuating screwjacks. The two upper beams incorporate trackways on which the translating cowl locates. Located between the beams are rectangular boxes containing deflector vanes.

Mounted on the front ring of the case and attached to the screwjacks are six gearboxes, interconnected by flexible drives. The inside of the case, which forms a section of the cold stream duct, is lined with acoustic material.

(2) Translating Cowl

The translating cowl (zone 412, 422 and 432) extends around the reverser case and, in forward thrust configuration, forms the aerodynamic line of the propulsion system. Secured around the front structural ring of the cowl are fifteen finger brackets to which the blocker flaps are secured.

R Mounting flanges, are provided in the translating cowl
R front structural ring for the screwjack mechanical drive
R housings. Bolts between the front structural ring and
R the mechanical drive housings provide the means of
R retaining the translating cowl on to the engine. Drive
R for the translating cowl is provided by the actuating
R screwjacks.

Built into the longitudinal edges of the cowl are two channel sectioned guide rails that locate the cowl on the trackways of the reverser case.

During forward thrust operation the reverser is sealed to the firewall (Ref. 71-30-00) by a circumferential pressure seal around the translating cowl front face. The rear seal is formed by a nozzle extension and seal assembly (Ref. 78-12-00). The translating cowl to pylon seal on wing installations is provided by removable seals fitted along the upper edges of the translating cowl; these are replaced on fuselage installed units by fuselage mounted seals.

(3) Blocker Flaps

In the forward thrust position the cold stream reverser deflector vanes are blanked off internally by fifteen pairs of folding flaps, forming part of the cold stream duct. In the reverse thrust position the flaps fold rearward and inward to expose the deflector vanes and blank off the cold stream duct downstream of the reverser. Thirteen pairs of flaps are identical; the remaining two pairs, situated either side of the pylon, are shaped to clear the pylon in the reverse thrust configuration.

Each pair of flaps is hinged in the centre and the rear flap is also hinged to the rear ring of the reverser case. The front flap is connected to the translating cowl finger bracket to ensure simultaneous translation. Inward folding of the flaps is achieved through an operating link, connected between the finger bracket and the rear flap. Each flap is lined with acoustic material.

(4) Deflector (Cascade) Vanes

The deflector vanes are contained in rectangular boxes mounted between the longitudinal beams of the cold stream reverser case. The vanes are uncovered for reverse thrust operation by the rearward movement of the translating cowl and blocker flaps. The blocker flaps direct the cold stream gases into the deflector vanes, which direct them through the correct efflux angle for the particular installation.

There are twenty boxes, ten wide and ten narrow, all of equal length; the narrow boxes being located adjacent to the longitudinal beams of the reverser case. Mounted along the centre line, on the inside, of the wide boxes are spring loaded swivel flaps that lie between the blocker flaps during forward thrust operation. During reverse thrust operation these flaps are forced open by the airflow through the vanes.

Deflector box positions are identified by numbers 1 to 20 painted on the firewall and reverser case forward of the relevant deflector box, numbered clockwise viewed from the rear with number 1 positioned at the top right. An identification plate, attached to each deflector box, identifies box position and provides installation details, e.g. a deflector box labelled 2C 18R 6LR 14R, can be fitted at the No.2 position on the centre (No.2 engine) installation, No.18 position on the right-hand (No.3 engine) installation, No.6 position on the left-hand (No.1 engine) or right-hand installation, or No.14 position on the right-hand installation.

(5) Translating Cowl Locking Mechanism

The translating cowl locking mechanism, positioned on the R.H. and L.H. centre gearboxes, retains the translating cowl in the forward thrust position and prevents in-flight translation in the event of malfunction of the control and actuating system. The mechanism is operated by the lock sequencing valve and secondary lock ram when reverse thrust is selected.

Each locking mechanism comprises a lock yoke that bridges the screwjack to gearbox retaining nut on the centre gearboxes. The arms of the yoke form pivot arms, located in bushes and supported by plates bolted to each side of the gearbox casing. The yoke arms also incorporate machined lugs that provide engagement with corresponding lugs on the lock body, attached to the translating cowl mechanical drive housing. An extension arm, attached to the top of the yoke, houses a control rod that passes through the firewall and connects to a bellcrank lever on the L.P. compressor case. The lock sequencing valve piston rod and the secondary lock ram piston rod also connect to one arm of each bell-crank lever.

The four bolts attaching the lock body to the mechanical drive housing are special waisted bolts that pass through the lock body and retain four crush tubes. The purpose of these is to reduce any shock loading induced as a result of malfunction of the control and actuating system.

Each locking mechanism is released by its actuator piston movement. The lock yoke pivots forward to clear the lock body and is retained in this position by a spring loaded latch attached to one of the side plates. A spring loaded lever is actuated by the lock yoke as it pivots forward causing an indicating rod to protrude through the firewall and provide visible indication of lock disengagement.

The lock yoke is released by a lock probe, attached to an extended arm on the lock body. As the translating cowl approaches forward thrust position the lock probe contacts the spring loaded latch and lifts it clear of the yoke, permitting the yoke to pivot rearward and engage the lock body.

(6) Fairings

Translating and non-translating fairings (fig.7) are fitted at the translating cowl to pylon/fuselage interface. Translating fairings, secured to the upper edges of the translating cowl, fair the cowl to the pylon or fuselage, depending on the installation. The fairings follow the outline of the basic translating cowl to its upper edge; for fuselage installation the fairing is then recurved to follow the contour of non-translating fairings. For wing installation the translating fairing is replaced by a straight edged fairing to which a removable sealing strip is attached, providing a seal between pylon and translating cowl.

Two non-translating fairings continue the translating cowl blister profile rearward to fair with the pylon, or fuselage, at the cold stream nozzle to pylon interface. The fairings are secured to brackets which in turn are secured to the rear section of hoop plate.

Two internal blister fairings (fig.7), located inside the cold stream nozzle on either side of the pylon fairing, provide internal anti-vortex blisters. The fairings are secured by two of the bolts securing the hoop plate to nozzle.

B. Actuating System

(1) Selector Valve (Garrett AiResearch: Directional Control Linear Valve).

A two position, two spool, selector valve is mounted on top of the L.P. compressor case (fig.4). Its function is to feed a pneumatic extend (reverse thrust) or retract (forward thrust) signal to the air motor, depending on the configuration selected.

The extend signal is sequenced through the lock sequencing valve and the secondary lock ram. The retract signal is fed directly to the air motor.

The primary spool (fig.5) is connected to the throttle linkage by an actuator rod and is mechanically actuated through the reverse thrust lever. The actuator rod is centralized in the primary spool by springs, permitting overtravel between rod and spool in either direction. Magnets are incorporated at each end of the valve body to provide positive positioning of the primary spool.

The secondary spool is spring loaded to the retract position. It is pneumatically actuated via a solenoid valve, the operation of which is simultaneous with mechanical operation of the primary spool, thus ensuring system operation in either direction is dependent on the correct sequencing of both spools.

(2) Pressure Regulating and Shut-Off Valve (Garrett AiResearch: Differential Shut-Off Fluid Pressure Regulating Valve)

The P.R.S.O.V. is a solenoid operated, pneumatically actuated valve located in the thrust reverser air supply duct in the interservices fairing (fig.2 and 5). Its function is to maintain airflow to the air motor at a near constant value over a wide range of supply pressures, and to prevent airflow to the air motor when the thrust reverser system is not in use.

The P.R.S.O.V. comprises a butterfly type valve (fig.5), spring loaded to the closed position and controlled by a pneumatic actuator, which is divided by a diaphragm into an opening chamber and a closing chamber. Pressure from upstream of the valve is supplied to the opening chamber via a solenoid operated valve, and a relief valve that maintains pressure within the chamber at a regulated value. The closing chamber receives downstream pressure through the sensing selector.

The sensing selector prevents downstream pressure entering the closing chamber, thereby ensuring that the butterfly valve remains fully open, until inlet pressure reaches the minimum required downstream pressure.

A shuttle valve ports supply pressure or downstream pressure to the sensing selector.

During the retract cycle the solenoid is de-energised but the solenoid valve is held open by a pneumatic override signal, sequenced through the lock sequencing valve from a tapping on the H.P. air ducting. The signal is cancelled when the lock sequencing valve is retracted.

Provision is made to manually return the P.R.S.O.V. to the closed position, and secure in this position, in the event of valve failure in the open mode and the necessity to operate the aircraft with the thrust reverser inoperative.

(3) Lock Sequencing Valve (Garrett AiResearch: Pneumatic Lock Fan Actuator)

The lock sequencing valve (fig.5) is a pneumatically actuated valve, mounted on the firewall at the right-hand side. The valve retains the translating cowl right-hand locking mechanism in the locked position during forward thrust operation and sequences the system operation when reverse thrust is selected.

The unit comprises a valve body, housing an actuator piston and piston rod. The actuator piston is spring loaded in the retracted position and is extended by air pressure, introduced via the selector valve following selection of reverse thrust.

Extending the actuator piston disengages the translating cowl right-hand lock, at the same time uncovering a port in the valve body through which the air pressure is passed to the secondary lock ram. This movement also opens the ports to sequence the override signal to the P.R.S.O.V.

The lock sequencing valve is returned to the retracted position by the spring loading on the actuator piston following engagement of the translating cowl right-hand lock.

(4) Secondary Lock Ram

The secondary lock ram (fig.5) is a pneumatically actuated valve, mounted on the firewall at the left-hand side. The valve retains the translating cowl left-hand locking mechanism in the locked position during forward thrust operation and sequences the system operation when reverse thrust is selected.

R The unit comprises a valve body, housing an actuating piston and piston rod. The actuating piston is spring loaded in the retracted position and is extended by air pressure, introduced via the lock sequencing valve following selection of reverse thrust. Extending the actuating piston disengages the translating cowl left-hand lock, at the same time uncovering a port in the valve body through which the air pressure is passed to the air motor directional control valve actuator.

R The secondary lock ram is returned to the retracted position by the spring loading on the actuating piston following engagement of the translating cowl left-hand lock.

(5) Air Motor (Garrett AiResearch: Pneumatic Drive Unit Actuator)

The air motor (fig.3) provides the power to actuate the thrust reverser system in either direction and provides speed and positional control throughout the operating cycle. Provision is made to prevent mid-stroke reversal of the system.

The unit is mounted above the exhaust transition case and comprises the following sub-assemblies (fig.6).

Motor

The motor is a gear type, bi-directional motor, providing the motive power for the system. It can supply or absorb power, depending on whether the forces are aiding or opposing the direction of rotation.

Directional control valve (D.C.V.)

A directional control valve, integral with the air motor, determines the direction of air flow through the motor and consequently the direction of rotation
R of the motor. The D.C.V. is a butterfly type valve, actuated by a piston type actuator, the position of which is determined by a pneumatic signal from the selector valve. An over-centre spring latch is incorporated in the D.C.V. linkage to ensure positive positioning.

A directional control valve lock prevents mid-stroke reversal of the system if an opposite signal is received while the air motor is performing an extend or retract function.

Snubber valve

Situated in the air motor exhaust, the snubber valve is a butterfly valve used to control air motor speed through a pneumatic actuator.

On engines without S.B.78-5704, maximum speed is governed by action of the speed control valve (para 3.A.).

On engines with S.B.78-5704 the speed control valve is deleted. Air motor speed is controlled by the use screwed stops which limit the snubber valve range of travel.

The snubber valve is closed, to provide rapid deceleration of the motor. This is achieved through the action of a snubber vent valve that is opened, after a pre-determined number of revolutions of the motor, by an actuating arm splined to a feedback translating nut; the latter being driven from an extension of one of the rotor shafts. The snubber vent valve vents the snubber dump valve control pressure by providing a passage to atmosphere through an interlock vent valve, resulting in the snubber dump valve opening and venting the snubber valve actuator.

Stow vent valve

A poppet type stow vent valve, controlled by a logic valve, maintains air motor power during the deceleration stage of the retract cycle, sufficient to overcome system sealing loads. This is achieved by venting pressure from downstream of the motor after the snubber valve closes, thereby decreasing the reverse differential pressure across the motor.

R On engines with S.B.78-8089 the stow logic valve is
R inoperative, the stow vent valve remains open the
R the entire stow cycle to ensure compression of the
R translating cowl seals.

Braking system

A disc type brake, controlled by a pneumatic actuator, stops the reverser at the end of each cycle and holds it in this position until the opposite mode is selected. This is achieved through a brake vent valve and a brake dump valve, operated by the feedback system similar to the operation described for snubber valve operation. The brake also locks the system in the event of air loss.

Brake Lock-out Valve

Units with this Service Bulletin, feature a brake lock-out valve that prevents air being supplied to the air motor brake actuator, thus preventing brake release, until the system is correctly sequenced and the D.C.V. has actuated in response to the appropriate signal.

(6) Flexible Drives

The flexible drives transmit the air motor output drive to the gearboxes of the cold stream reverser.

Two flexible drives connect the air motor with two of the translating cowl gearboxes and five other drives are used to interconnect the individual gearboxes.

Each drive assembly consists of a braided outer casing, containing a flexible inner core with square end fittings that locate in the air motor and gearbox drives.

The outer casings incorporate end fittings by which the flexible drive assemblies are attached to the appropriate units. The translating cowl flexible drives are secured to the gearboxes by ring nuts and to the air motor by two-bolt attachment flanges.

(7) Gearboxes

During extension or retraction of the thrust reverser system, air motor output drive is transmitted by the flexible drives to the gearboxes of the cold stream reverser. The gearboxes reduce the high output speed of the motor and transmit the drive to the screwjacks.

Six ballscrew gearboxes (fig.7) drive the cold stream reverser screwjacks. The gearboxes are mounted around the reverser case and are basically identical, except the gearbox mounted at the upper left-hand position. This is a feedback gearbox incorporating a feedback arm that operates an interlock device on the engine controls (Ref. 76-11-02) to provide a baulk, restricting engine power to idle during initial rearward or forward movement of the reverser. The output drive shaft of each gearbox is splined to the appropriate screwjack, which is secured to the gearbox by a retaining nut and lockwasher.

R On engines featuring gearboxes with AiResearch S.B.121186-78-1172 at the mid L.H. and R.H. positions
R a manual winding and lock-out facility is provided. Access to each gearbox is gained by removing a small plate secured to the side of the firewall (S.B.78-3608).

(8) Screwjacks

The screwjacks are the final drive members of the thrust reverser system. They convert rotary output to axial movement to operate the cold stream reverser translating cowl. Six screwjacks (fig.7) operate the translating cowl.

Each screwjack is splined to the output drive of the appropriate gearbox and secured by a retaining nut and lock-washer. The opposite end is located in a bearing housing.

The translating cowl screwjacks are located in the longitudinal beams of the reverser case. Each screwjack incorporates a recirculating ball type translating nut, housed in a mechanical drive housing to which the translating cowl is attached.

(9) Pressure Switch

A proximity type pressure switch (fig.4) is incorporated in the control air supply line downstream of the P.R.S.O.V. and is mounted on the L.P. compressor case, adjacent to the selector valve. The unit senses pressure in the air ducting when the P.R.S.O.V. is open and provides indication of this condition at the flight station (fig.1).

The unit comprises a proximity sensor and a spring loaded piston incorporating a proximity target. Air pressure moves the piston, which carries the target toward the sensor. The sensor transmits a signal to a proximity switch (fig.8) to provide an illuminated REVERSER OPERATING indication at the flight station.

(10) Proximity Switch Sensor

Two proximity switch sensors provide flight station indication of system operation.

One is adjacent to the secondary lock ram (fig.4) and provides indication of translating cowl locks disengagement. The other is attached to the intermediate hoop plate (fig.7) to provide indication of translating cowl fully extended.

The translating cowl locks sensor is mounted on the lock ram mounting bracket. A steel plate, riveted to one of the bellcrank arms, provides the target arm. As the bellcrank rotates due to the movement of the secondary lock ram, the target arm moves across the face of the sensor and changes the value of a signal to a proximity switch (fig.8). This illuminates the REVERSER IN TRANSIT indicator at the flight station to indicate translating cowl unlocked.

The translating cowl extended sensor is mounted at the rear, R.H. side of the intermediate hoop plate. A target is mounted at the forward end of the translating cowl and as the cowl completes its rearward movement, the target moves across the face of the sensor and changes the value of a signal to a proximity switch. This extinguishes the REVERSER IN TRANSIT indicator at the flight station to indicate reverser system fully extended.

Both signals are cancelled as the respective targets move away from the sensors when the system returns to forward thrust.

R On engines with S.B.78-3753 an additional sensor is introduced to indicate a translating cowl unstowed condition. This sensor is mounted at the forward L.H. side of the hoop plate (Ref. fig.7). The sensor is wired in parallel with the lock sensor to operate the same flight station indicator light. A target is mounted on the forward L.H. side of the translating cowl and as the cowl reaches the stowed position the target moves across the face of the sensor and changes the value of a signal to the proximity switch. This extinguishes the indicator at the flight station provided that the lock sensor is signalling a locked condition.

C. Thrust Reverser P.R.S.O.V. Deactivation Valve (S.B.78-3571)

The deactivation valve (Ref. fig.4) is located at the rear L.H. side of the interservices fairing support structure and can be operated through a hole in the fairing.

The valve basically comprises a body that houses a spring loaded plunger and incorporates an inlet connector, an outlet connector, and a vent.

In its normal operating mode air flows to the inlet and passes through the valve to the outlet.

When the deactivating key is inserted in the valve the plunger is moved to align a vent passage with the inlet and at the same time closes off the outlet. Therefore any air flow to the inlet is vented.

The valve is connected by rigid and flexible tubes to the P.R.S.O.V. and is functionally interposed in the air supply to the P.R.S.O.V. opening chamber.

The purpose of the deactivation valve is to provide the means to prevent the P.R.S.O.V. opening when it is necessary to operate the aircraft with an inoperative thrust reverser system.

D. Air Ducting and Tubes (Fig.4)

Air for operating the thrust reverser system is supplied from the engine air off-take in the interservices fairing and is ducted through the fairing to the air motor inlet.

The ducting is in four sections interconnected by Vee band coupling clamps, with 'E' type seals interposed between the joint faces. Expansion and working movement are provided for by gimbal joints and a spherical joint. The intermediate section incorporates the P.R.S.O.V. and a tapping downstream of the valve provides connection for the control air supply tube to the selector valve.

Flexible and rigid tubes carry the thrust reverser control air through the interservices fairing and firewall to the selector valve, the lock sequencing valve and the secondary lock ram. From these units the air is directed rearwards through the firewall and interservices fairing to the air motor. To provide the override signal to the P.R.S.O.V. rigid tubes direct air from the H.P. off-take duct through the firewall to the lock sequencing valve and then to the P.R.S.O.V.

3. Operation

A. Selection of Reverse Thrust

Reverse thrust can only be achieved after the aircraft has landed and closed the undercarriage squat switch (air/ground sensing system, Ref. 32-63-00).

Reverse thrust is selected by moving the engine throttle lever to ground idle and lifting the reverse thrust lever. The contacts of the throttle lever microswitch (fig.5) close and energize the selector valve and P.R.S.O.V. solenoids. At the same time, movement of the reverse thrust lever positions the selector valve primary spool.

The P.R.S.O.V. solenoid valve (fig.5) opens; H.P. air enters the actuator opening chamber and opens the butterfly valve. H.P. air also enters the P.R.S.O.V. sensing selector and when the pressure exceeds a predetermined value the ball valve opens, allowing outlet pressure to enter the actuator closing chamber to counteract opening chamber pressure, thereby controlling valve opening and regulating air outlet pressure.

Regulated H.P. air flows to the air motor and control air to the selector valve and pressure switch. The pressure switch piston (fig.5) moves toward the proximity sensor causing the REVERSER OPERATING indicator at the flight station to come on.

Control air enters the selector valve and passes through the open solenoid valve to transfer the secondary spool to the extend position, thus sequencing air flow through the selector valve to the lock sequencing valve.

The lock sequencing valve extends releasing the translating cowl right-hand locking mechanism and sequencing airflow to the override signal port of the P.R.S.O.V. and also to the secondary lock ram. The secondary lock ram extends releasing the translating cowl left-hand locking mechanism, causing the proximity sensor signal to the proximity switch to change illuminating the REVERSER IN TRANSIT indicator at the flight station and sequencing airflow to the air motor D.C.V. actuator.

Control air enters the air motor (fig.6) through the extend signal port of the D.C.V. actuator. This repositions the actuator, the interlock vent valves and the D.C.V. in the extend position, causing the D.C.V. to direct H.P. air to drive the air motor in the required direction of rotation.

The brake lock-out valve (Fig.6) positioned in the regulated H.P. air supply line tapping to the brake and snubber circuits prevents airflow to these circuits until the system is correctly sequenced and the D.C.V. is correctly positioned. As control air (extend signal) repositions the interlock vent valve, this air is sequenced to the diaphragm area of the brake lock-out valve causing the diaphragms to move and sequence regulated H.P. air to the brake and snubber circuits.

The closed interlock vent valve causes regulated H.P. air pressure to increase in the brake and snubber circuits, closing the brake and snubber dump valves. Pressure increases at the snubber valve actuator, brake actuator and D.C.V. lock. The snubber valve begins to open, followed by brake release and engagement of D.C.V. lock.

The motor begins to rotate; the feedback translating nut moves allowing the lower actuating arm to move away from the lower vent valves causing the valves to close. The motor builds up to maximum speed as the snubber valve reaches its fully open position, increasing the velocity of the regulated H.P. airflow through the unit.

R Dynamic pressure acting on the speed control valve diaphragm increases and the valve opens, venting the snubber valve actuator. The snubber valve begins to close, reducing the pressure differential across the motor and, consequently, motor speed. Dynamic pressure on the speed control valve reduces and the valve closes. This reduces the closure rate of the snubber valve, thereby controlling motor speed.

R On engines with S.B.78-5704, the speed control valve is
R deleted. The air motor speed is controlled by use of screwed
R stops which limit the snubber valve range of travel.

The air motor output drive is transmitted through the flexible drives and speed reducing gearboxes, to the screwjacks of the cold stream reverser.

The cold stream reverser screwjacks move the translating cowl and blocker flaps rearward, at the same time the blocker flaps fold inward blocking the cold stream duct and diverting the gas stream through the deflector vanes to produce reverse thrust. As the translating cowl moves rearward the feedback gearbox relays the movement through the feedback mechanism to the baulk lever (Ref. 76-11-00).

The air motor continues at its controlled speed, until the feedback upper actuating arm opens the snubber vent valve and vents the snubber dump valve to atmosphere through the open interlock vent valve. The dump valve opens and releases the pressure remaining at the snubber valve actuator, closing the snubber valve.

A reverse differential pressure is produced across the motor causing the motor to act as a compressor and resulting in a rapid deceleration of the thrust reverser system. The feedback upper actuating arm opens the brake vent valve, venting the brake dump valve to atmosphere through the interlock vent valve. The dump valve opens to vent the D.C.V. lock and brake actuator, resulting in lock release and brake application.

As the translating cowl completes its rearward movement the R.H. target is adjacent to the extend proximity sensor and changes the signal to the proximity swtich, causing the REVERSER IN TRANSIT indicator at the flight station to go out.

B. Selection of Forward Thrust

Forward thrust is selected by moving the reverse thrust lever forward and downward with the engine throttle lever in the ground idle position. This repositions the selector valve primary spool (fig.5) and de-energizes the selector valve and P.R.S.O.V. solenoids. The selector solenoid valve closes and the secondary spool returns to the retract position under the influence of the return spring.

The solenoid valve of the P.R.S.O.V. (fig.5) is retained in the open position by the override signal, thereby maintaining normal P.R.S.O.V. operation described in the extend sequence, para.3.A.

Regulated H.P. air flows to the air motor and control air to the selector valve (fig.5). Control air is sequenced through the selector valve to the retract port of the air motor D.C.V. actuator, repositioning the D.C.V. and interlock vent valves in the retract position.

The brake lock-out valve receives control air (retract signal) from the D.C.V. actuator which repositions the brake lock-out valve diaphragms as described in the extend sequence.

The closed interlock vent valve causes the regulated H.P. air pressure to increase in the brake and snubber circuits causing the brake and snubber dump valves to close. Pressure increases on the snubber valve actuator, brake actuator and D.C.V. lock. The snubber valve begins to open, followed by brake release and engagement of D.C.V. lock.

The motor begins to rotate and the actuating arm moves away from the upper vent valves. The vent valves close and the snubber valve opens. The motor builds up to maximum speed and is controlled as described in the extend sequence.

The air motor output drive is transmitted through the flexible drives and speed reducing gearboxes, to the screwjacks of the cold stream reverser.

As the translating cowl and blocker flaps move toward the forward thrust position the extend sensor target moves
R away from the sensor and the REVERSER IN TRANSIT indication
R at the flight station comes on. Translating cowl movement is relayed by the feedback gearbox, through the feedback mechanism to the baulk lever (Ref. 76-11-00).

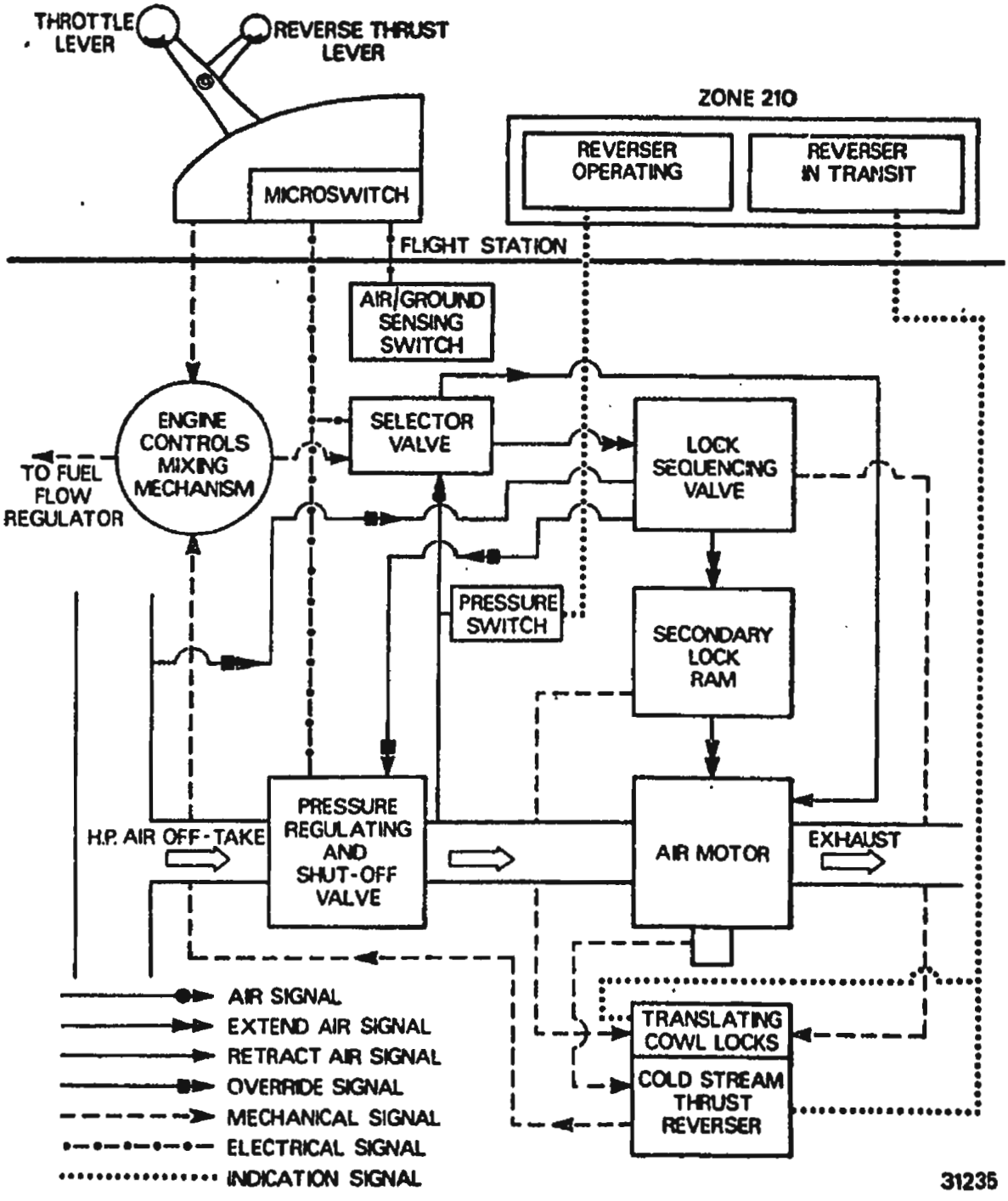
When the snubber valve closes during the deceleration stage and a high reverse differential pressure builds up across the air motor, pressure acting on the stow logic valve (fig.6) is vented to atmosphere through the snubber vent valve. The logic valve closes, permitting retract signal pressure to open the stow vent valve. Air motor downstream pressure is vented through the stow vent valve resulting in a decrease of the reverse differential pressure, thus maintaining sufficient power to overcome reverser system sealing loads.

R On engines with S.B.78-8089 the stow logic valve is
R inoperative, the stow vent valve remains open during the
R entire stow cycle to ensure compression of the translating
R cowl seals.

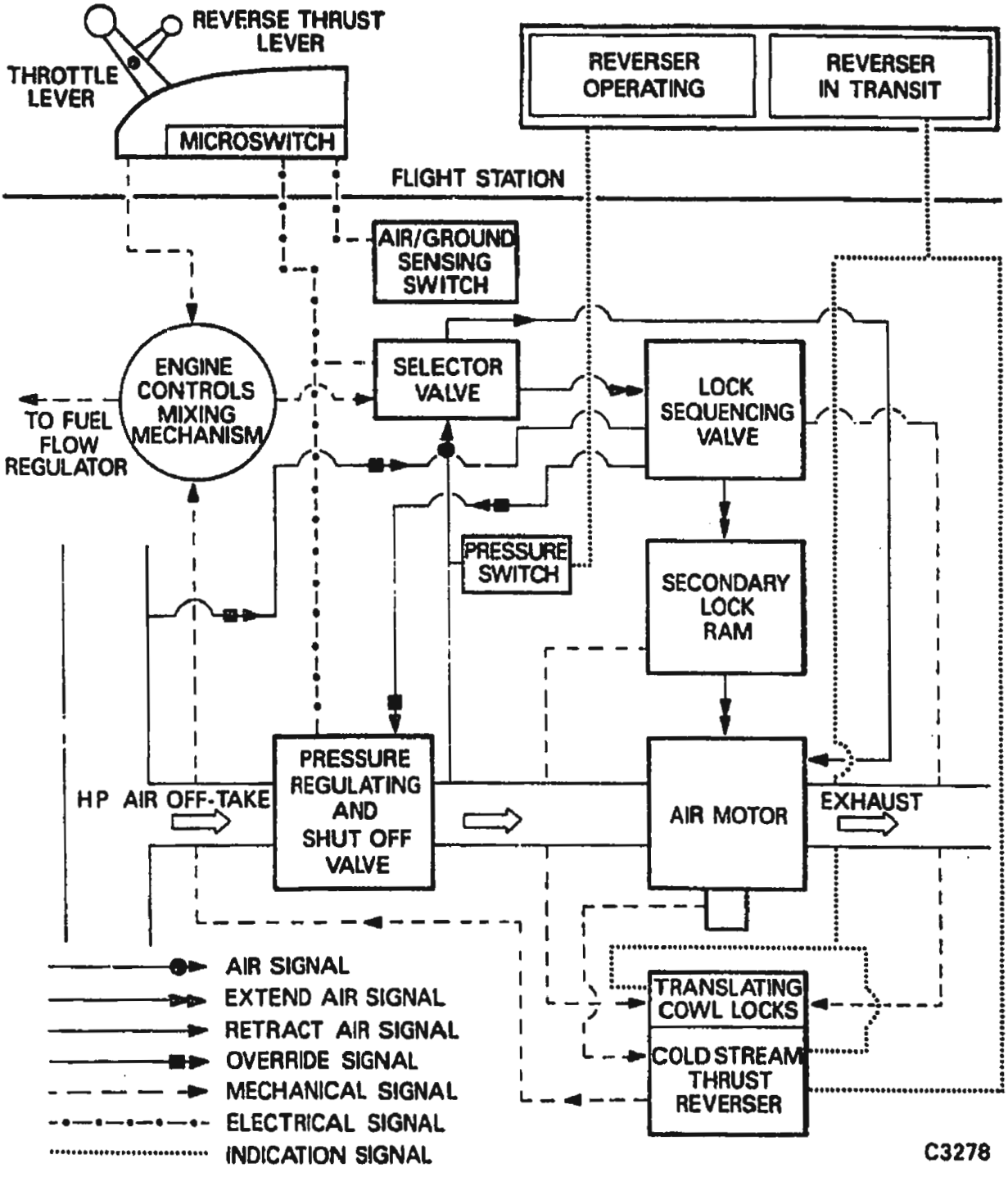
When the translating cowl reaches the forward thrust position, the lock probe attached to the L.H. and R.H. centre mechanical drive housing contacts its lock latch releasing the lock yoke. The spring loaded secondary lock ram retracts, actuating the locking mechanism to engage the left-hand lock and at the same time cancelling the signal to the proximity switch causing the REVERSER IN TRANSIT light to go out.

The spring loaded lock sequencing valve retracts, actuating the locking mechanism to engage the right-hand lock and at the same time cancelling the override signal to the P.R.S.O.V. The P.R.S.O.V. closes, the pressure switch piston moves clear of the proximity sensor and the REVERSER OPERATING signal is cancelled.

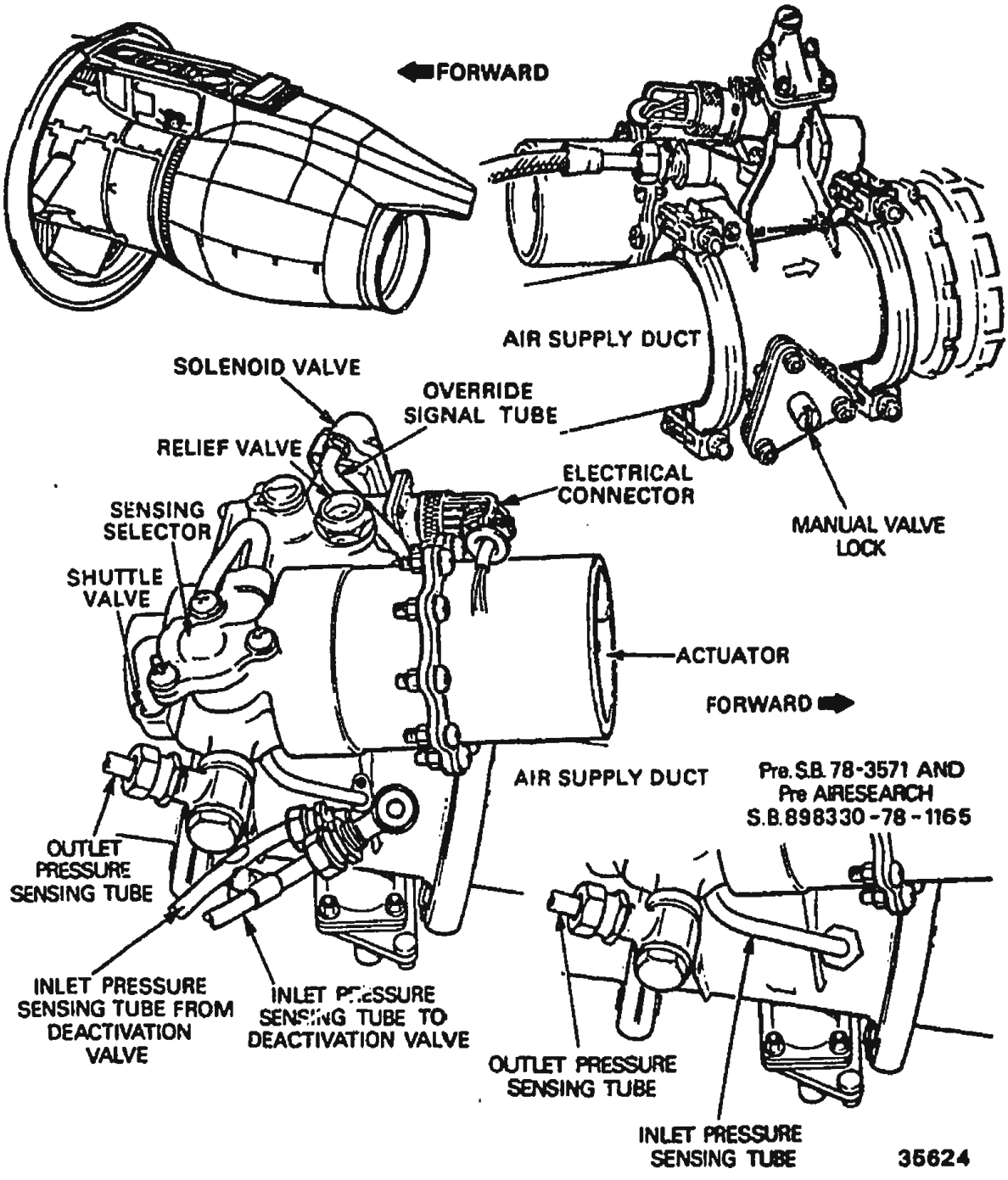
R Also on engines with S.B.78-3753, when the translating cowl reaches the forward thrust position the L.H. target moves across the stow sensor. This changes the signal to the same proximity switch as the locks removed sensor and provided that the correct signal is received from the locks sensor, the REVERSER IN TRANSIT light is extinguished indicating the translating cowl is fully retracted and locked.



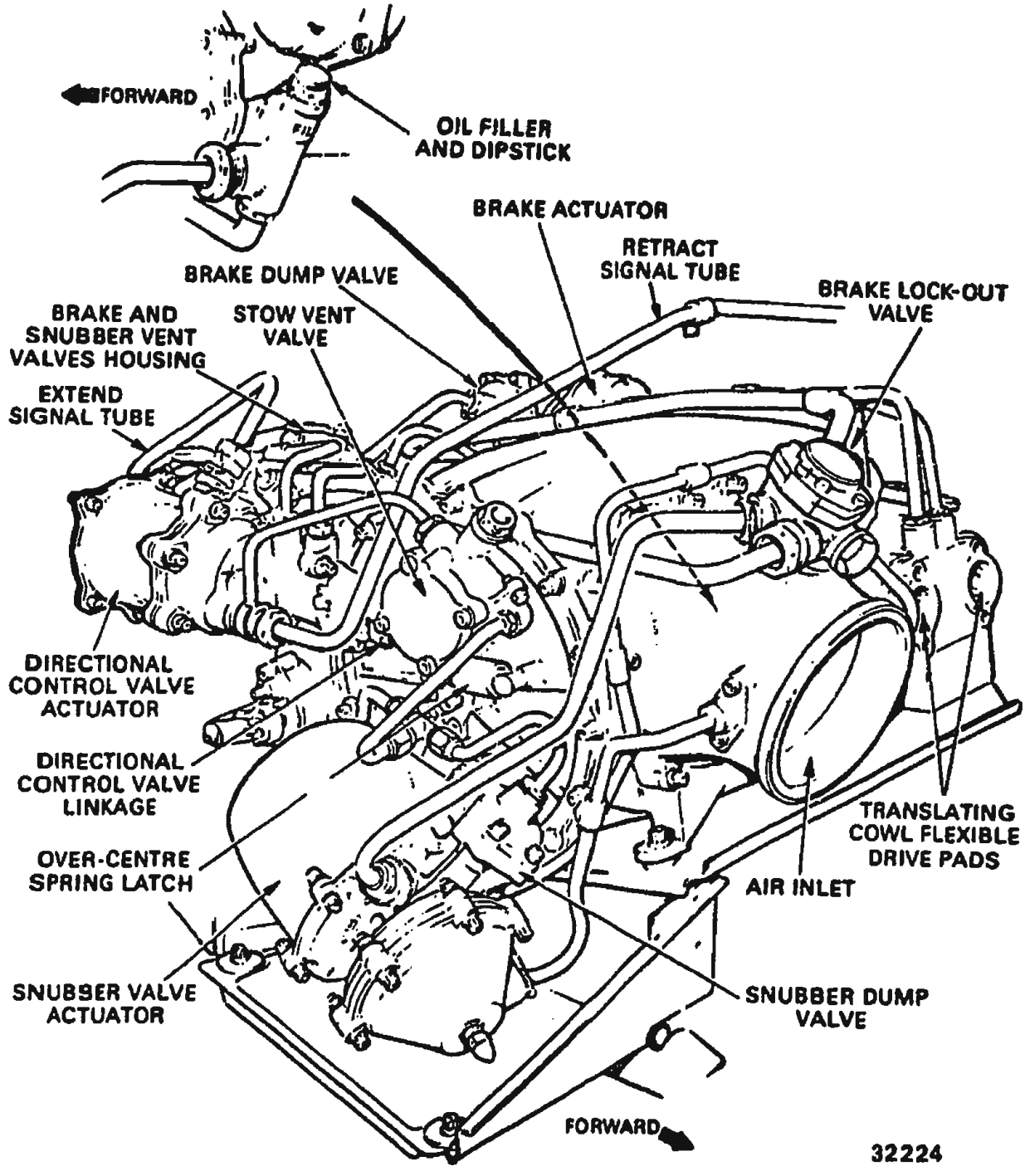
Thrust reverser system basic diagram (Engines without S.B.78-3753)
Fig.1 (Sheet 1)



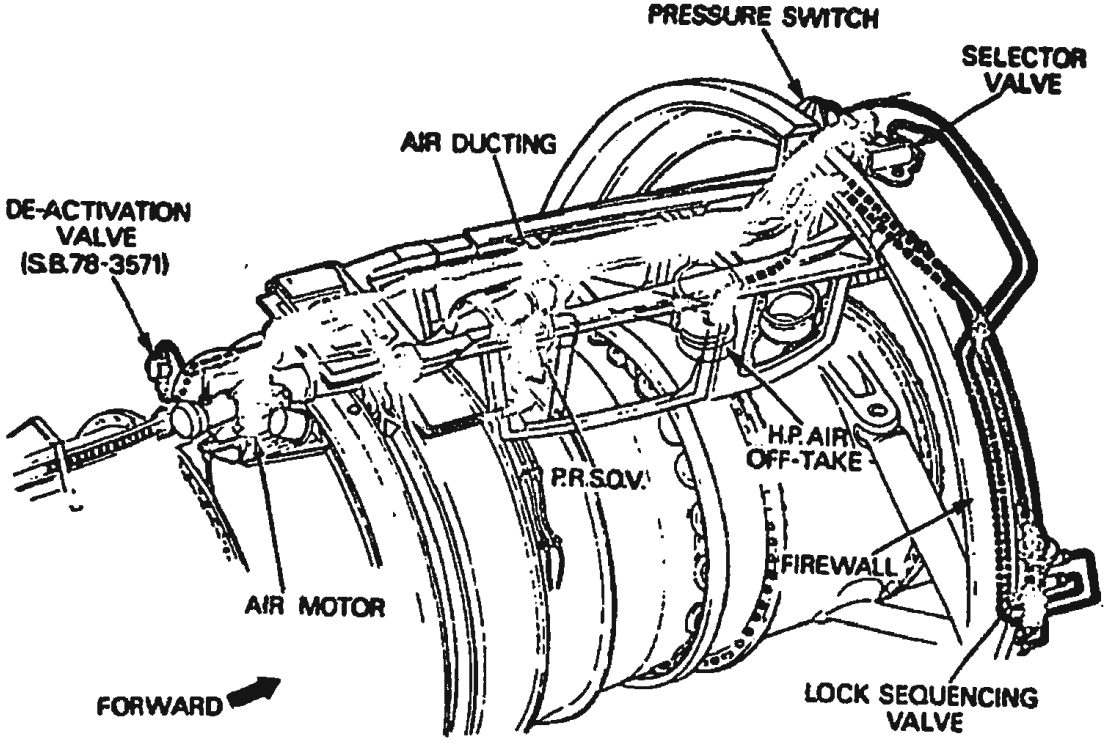
R Thrust reverser system basic diagram (Engines with S.B.78-3753)
R Fig.1 (Sheet 2)



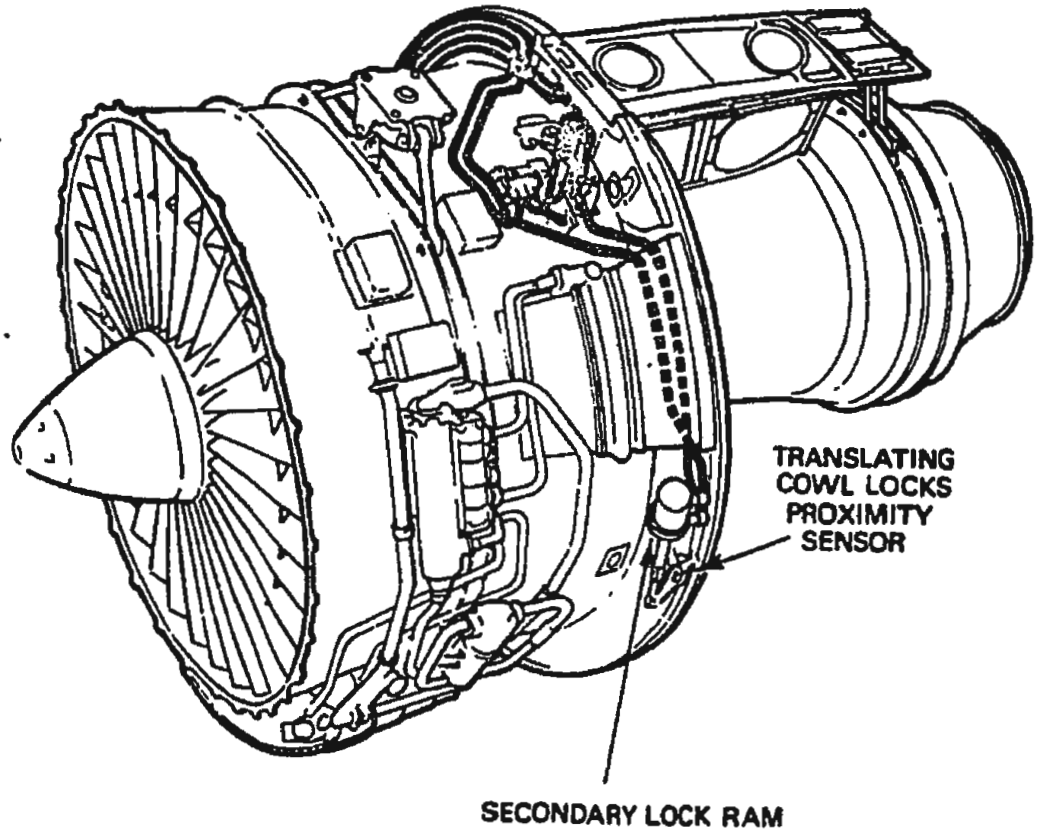
Pressure regulating and shut-off valve
Fig.2



Air motor
Fig.3

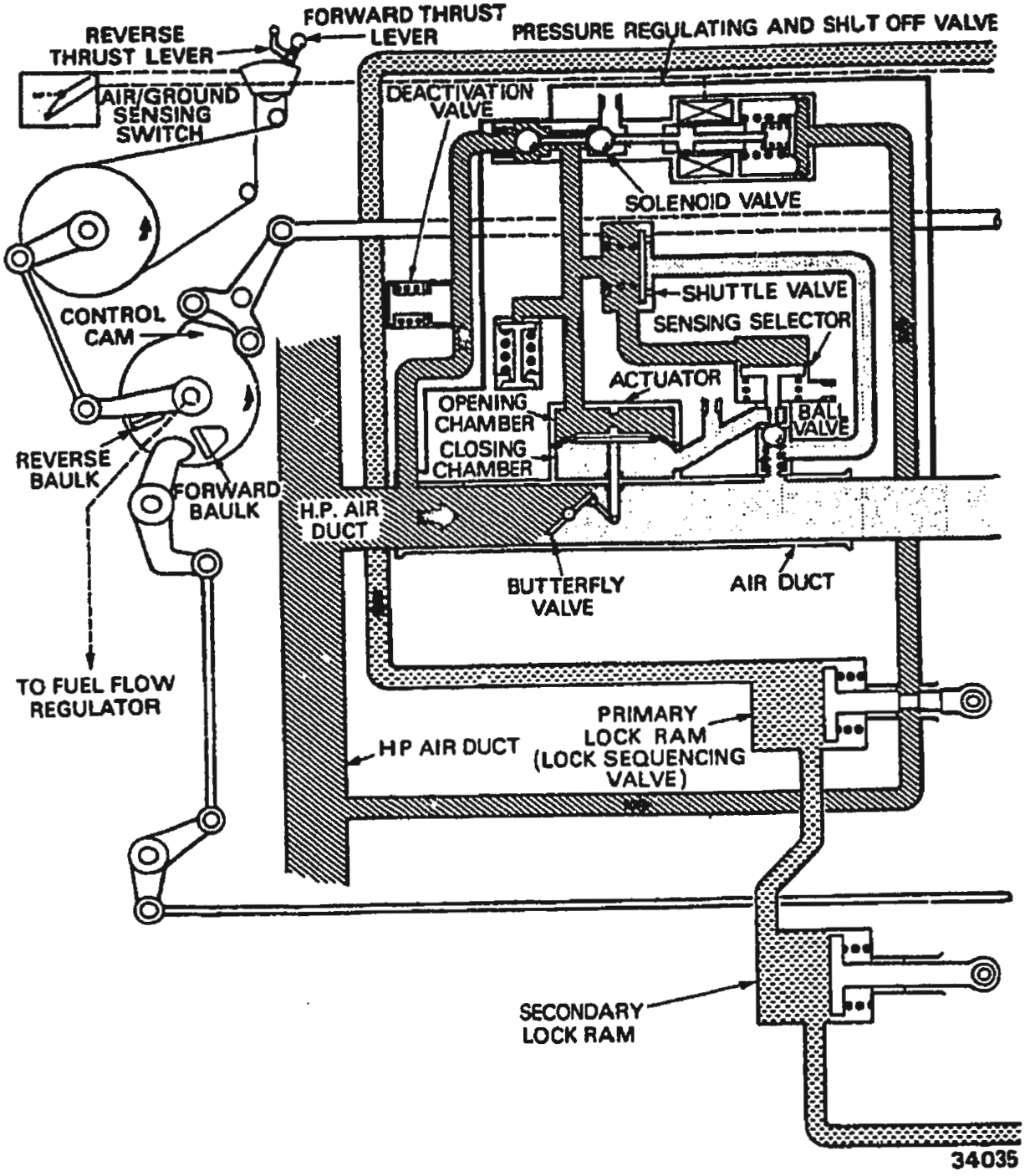


Thrust reverser air ducting and tubes
Fig.4 (Sheet 1)

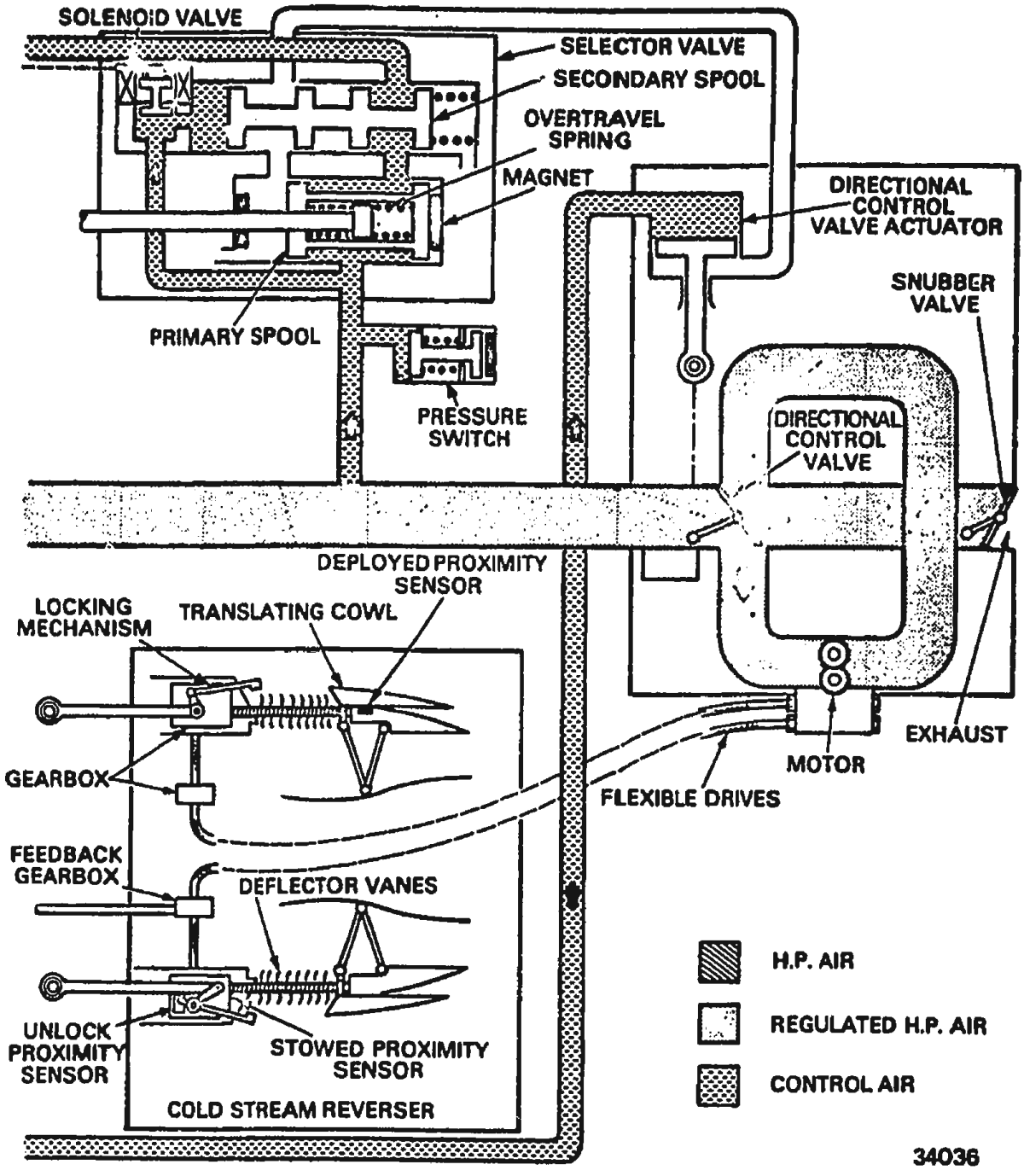


34147

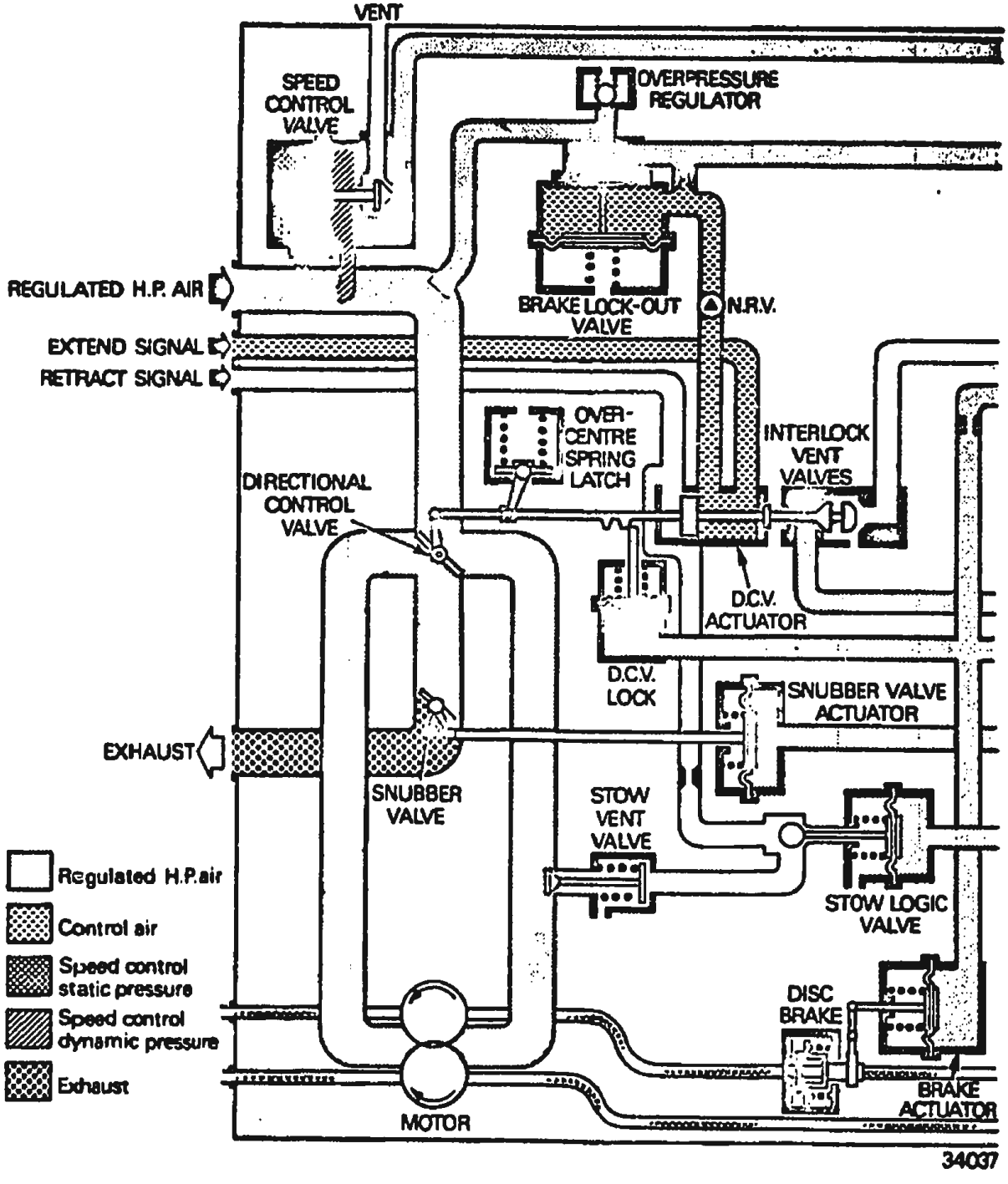
Thrust reverser air ducting and tubes
Fig.4 (Sheet 2)



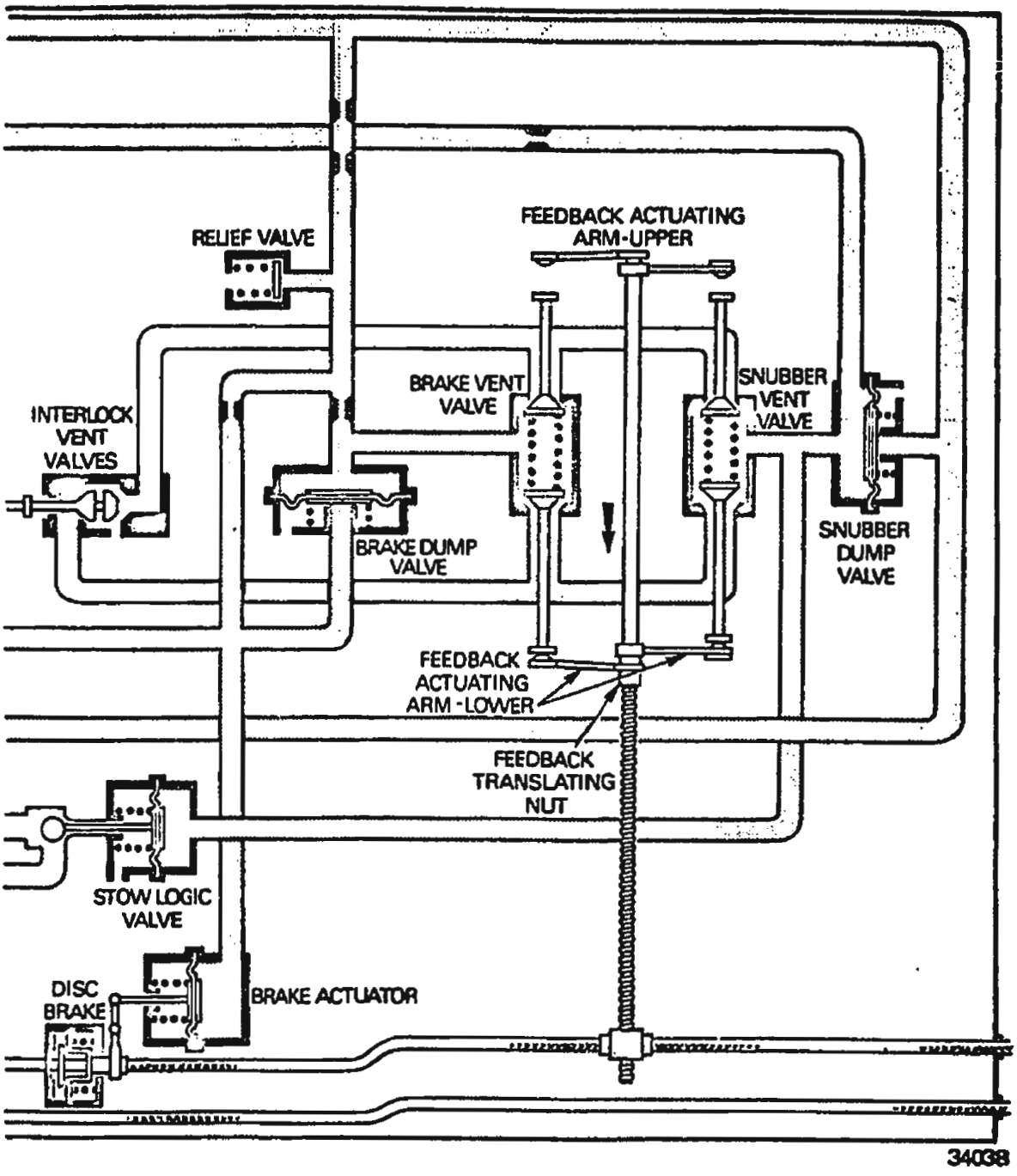
Thrust reverser system operation
Fig.5 (Sheet 1)



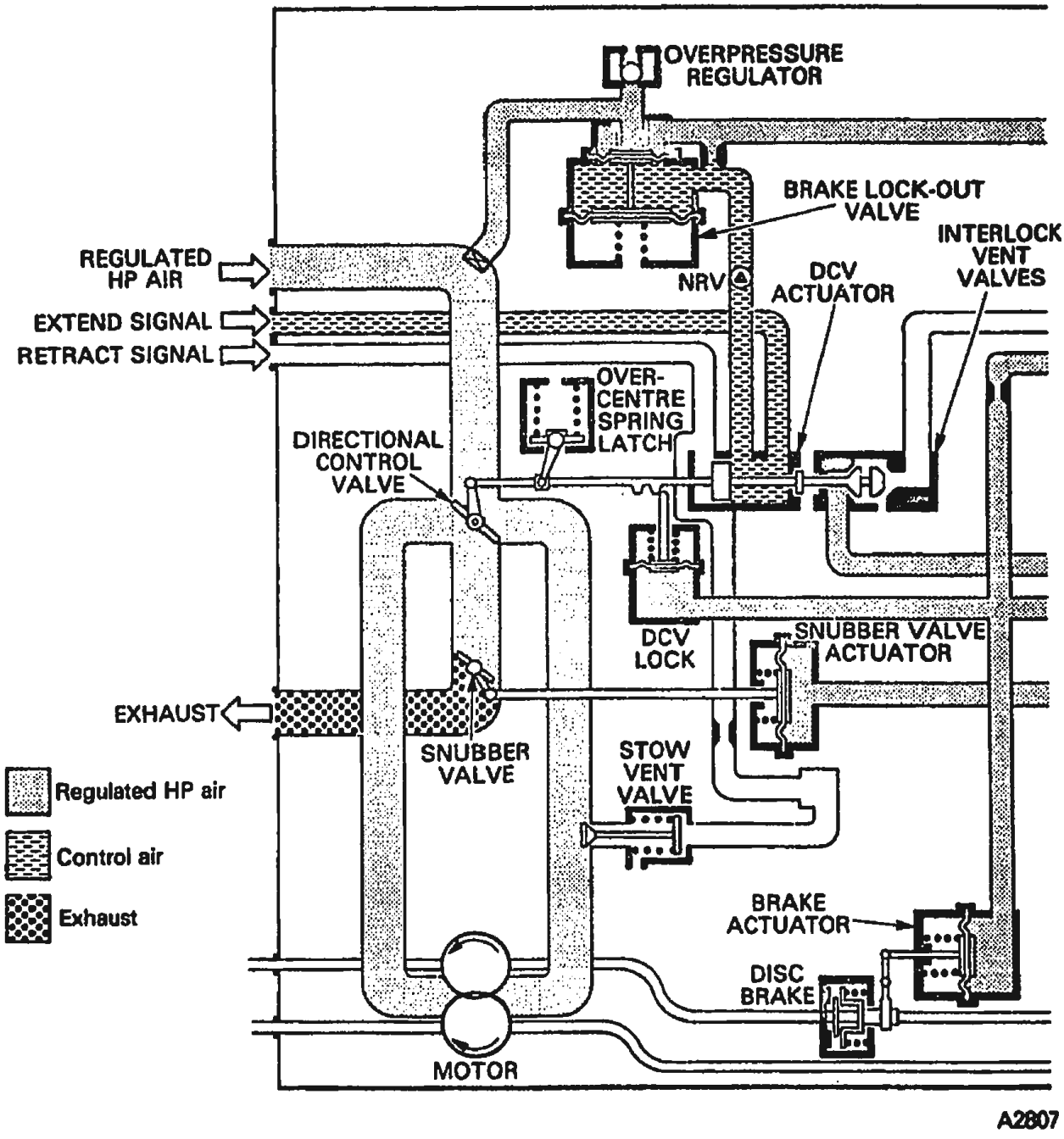
Thrust reverser system operation
Fig.5 (Sheet 2)



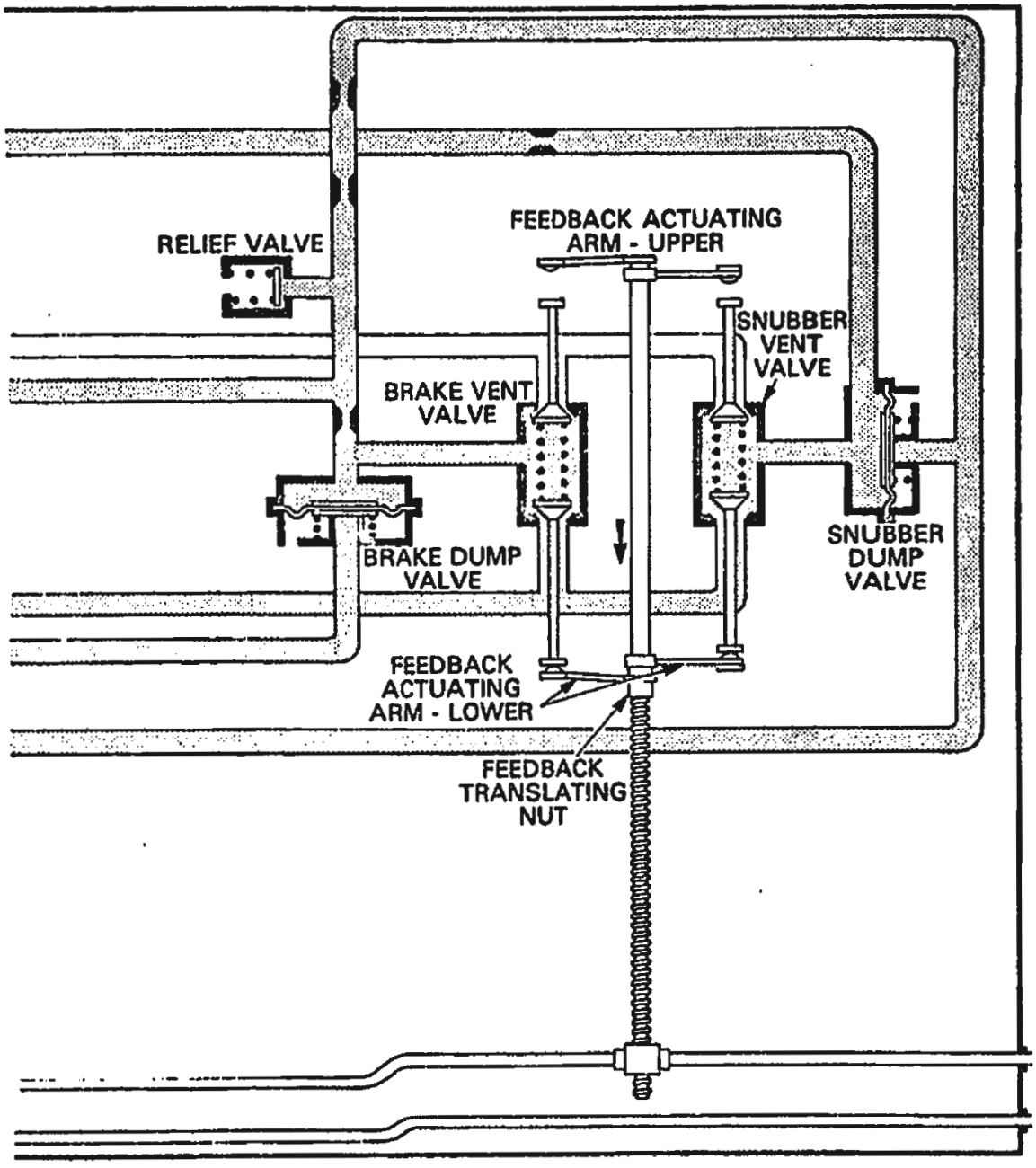
Air motor operation (Engines without S.B.78-5704, S.B.78-8089)
Fig.6 (Sheet 1)



Air motor operation (Engines without S.B.78-5704, S.B.78-8089)
Fig.6 (Sheet 2)

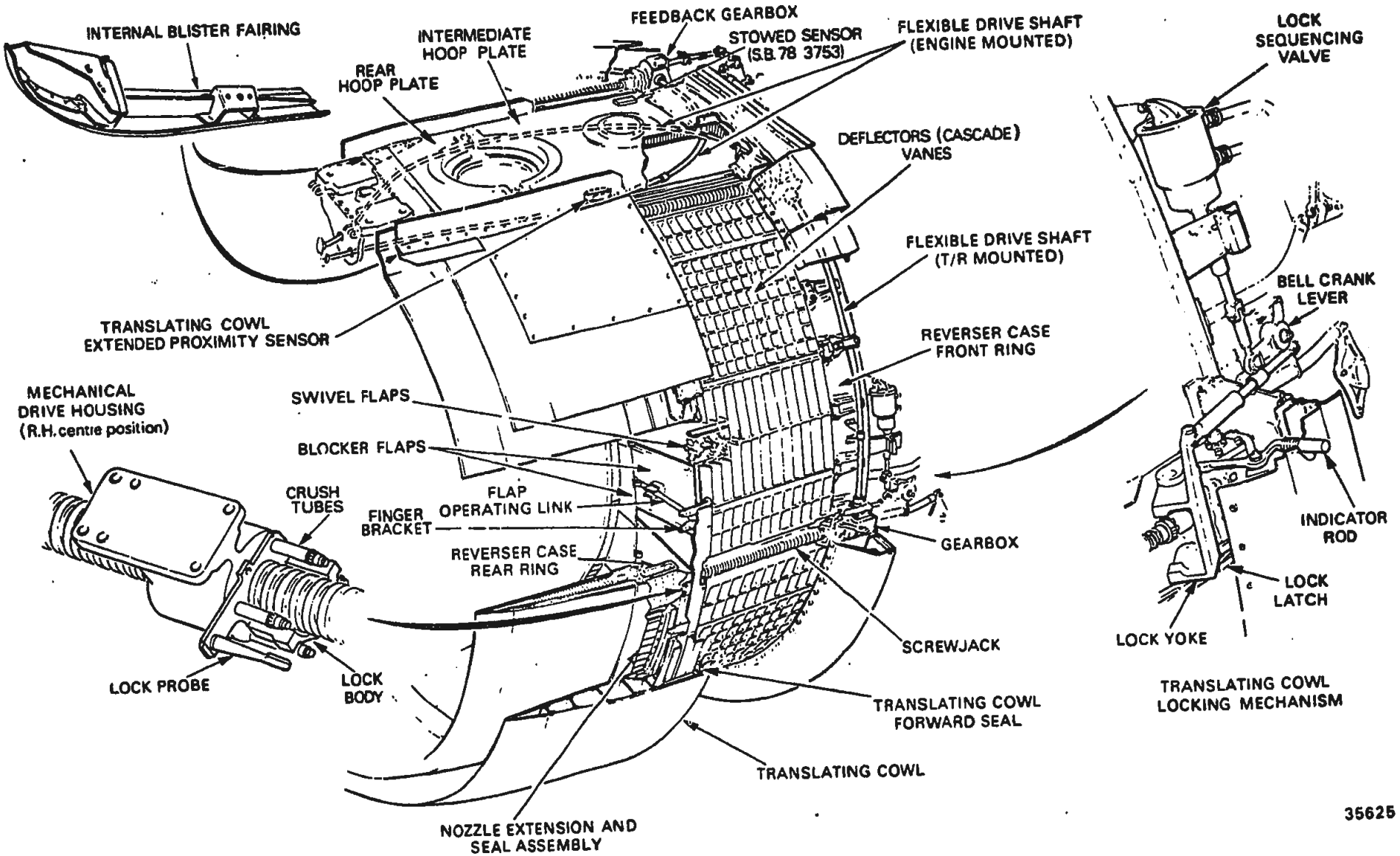


R Air motor operation (Engines with S.B.78-5704, S.B.78-8089)
R Fig.6 (Sheet 3)

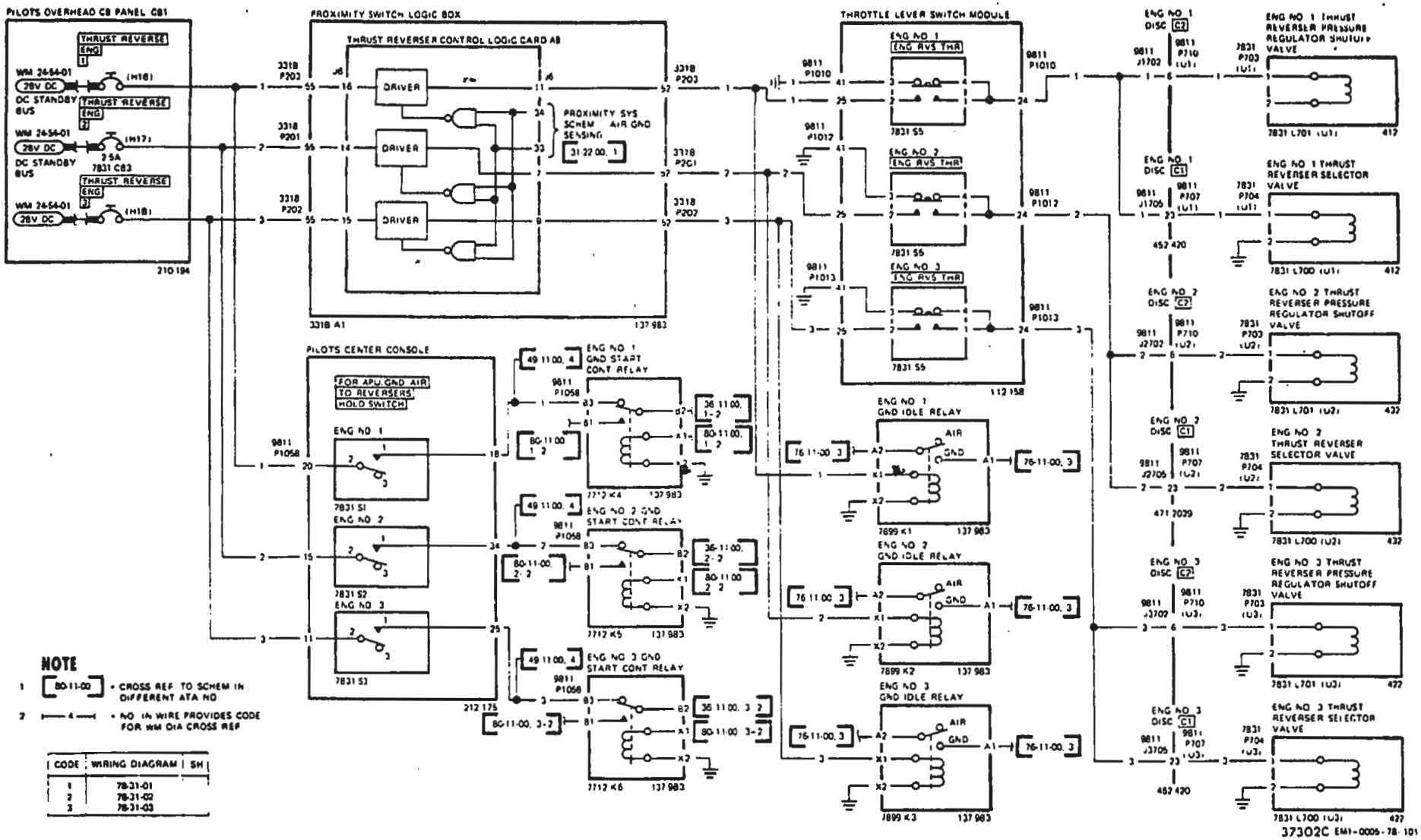


R Air motor operation (Engines with S.B.78-5704, S.B.78-8089)
R Fig.6 (Sheet 4)

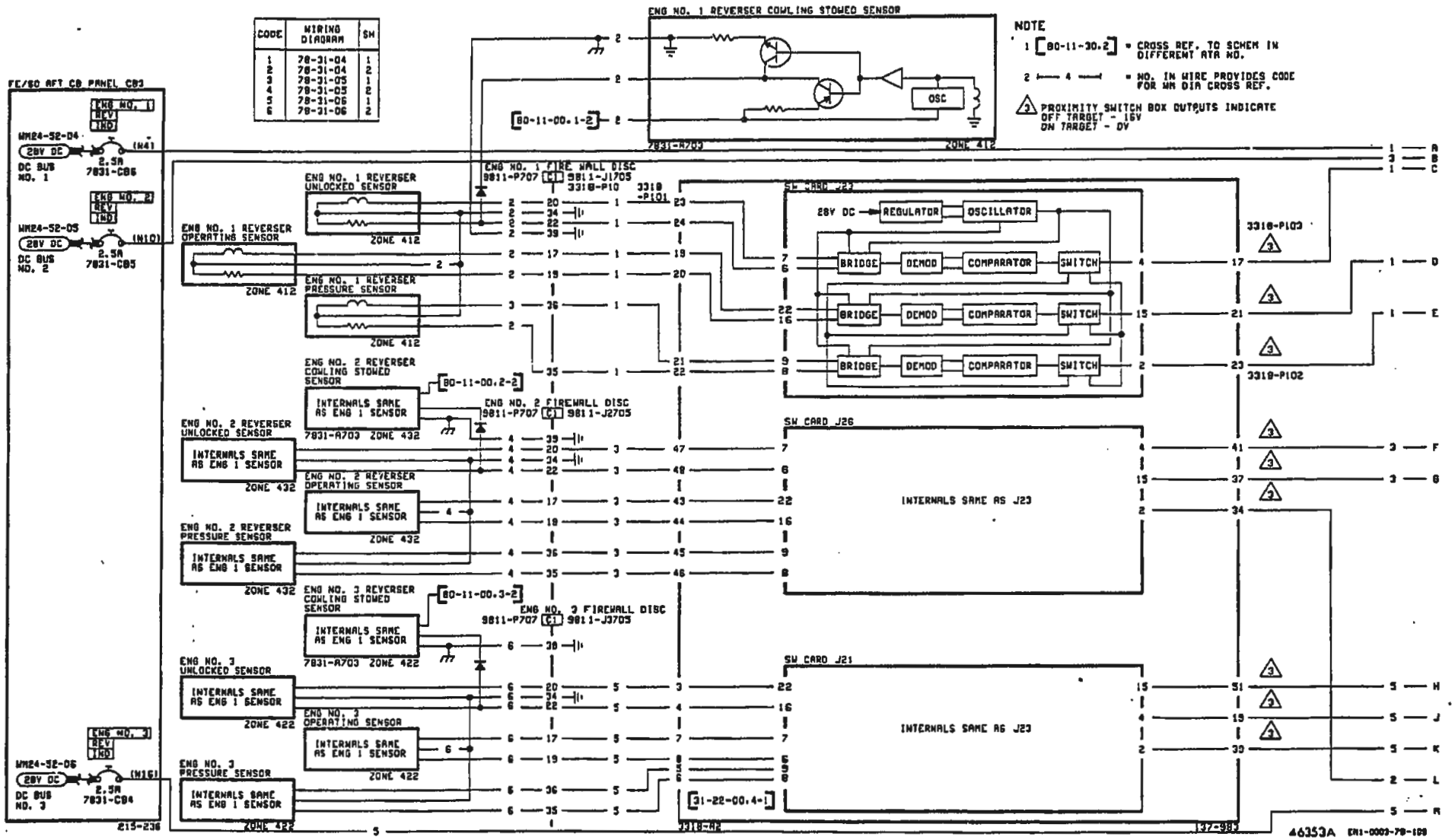
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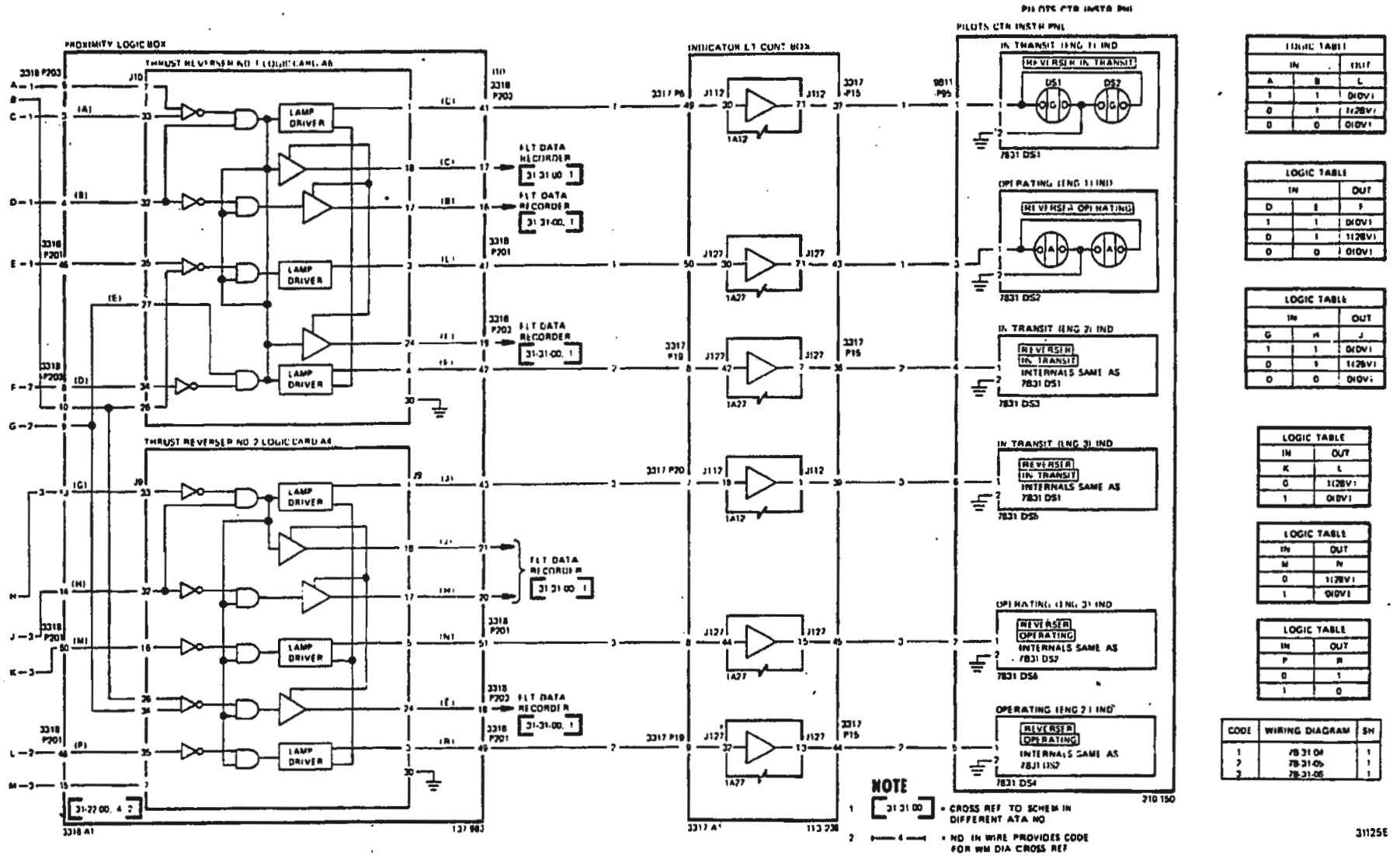
Cold stream reverser extended
Fig.7



Thrust reverser control system schematic
Fig.8 (Sheet 1)



Thrust reverser indication schematic
Fig.9 (Sheet 1)



LOGIC TABLE		
IN		OUT
A	B	L
1	1	0(0V)
0	1	1(28V)
0	0	0(0V)

LOGIC TABLE		
IN		OUT
D	E	F
1	1	0(0V)
0	1	1(28V)
0	0	0(0V)

LOGIC TABLE		
IN		OUT
G	H	J
1	1	0(0V)
0	1	1(28V)
0	0	0(0V)

LOGIC TABLE	
IN	OUT
K	L
0	1(28V)
1	0(0V)

LOGIC TABLE	
IN	OUT
M	N
0	1(28V)
1	0(0V)

LOGIC TABLE	
IN	OUT
P	R
0	1
1	0

CODE	WIRING DIAGRAM	SH
1	78-31-04	1
2	78-31-05	1
3	78-31-06	1

31125E

R Thrust reverser indication system schematic
R Fig.9 (Sheet 2)

R EFFECTIVITY: ALL

THRUST REVERSER - FAULT ISOLATION

1. General

The diagrams and schematics in this section can be used for fault isolation any time a fault is reported or suspected. Uncommon abbreviations are defined on the using fault code diagram or schematic.

If the flight crew reports a fault using a fault code number, the code number can be found in the Fault Isolation Reference Table in the Chapter 78 Fault Code Index. The index specifies the exact maintenance manual section, fault isolation diagram, and block number on the diagram where the fault isolation procedure should start. Where applicable, schematics are included at the end of the section to supplement the fault code diagrams or as an aid in isolating a problem not covered on the diagrams.

Refer to the Maintenance Manual Introduction for a more detailed discussion of the Fault Isolation Reporting Method (FIRM) and use of fault isolation diagrams/schematics.

2. Fault Isolation/Identification

Table 101 lists the fault isolation diagrams and schematics in this section.

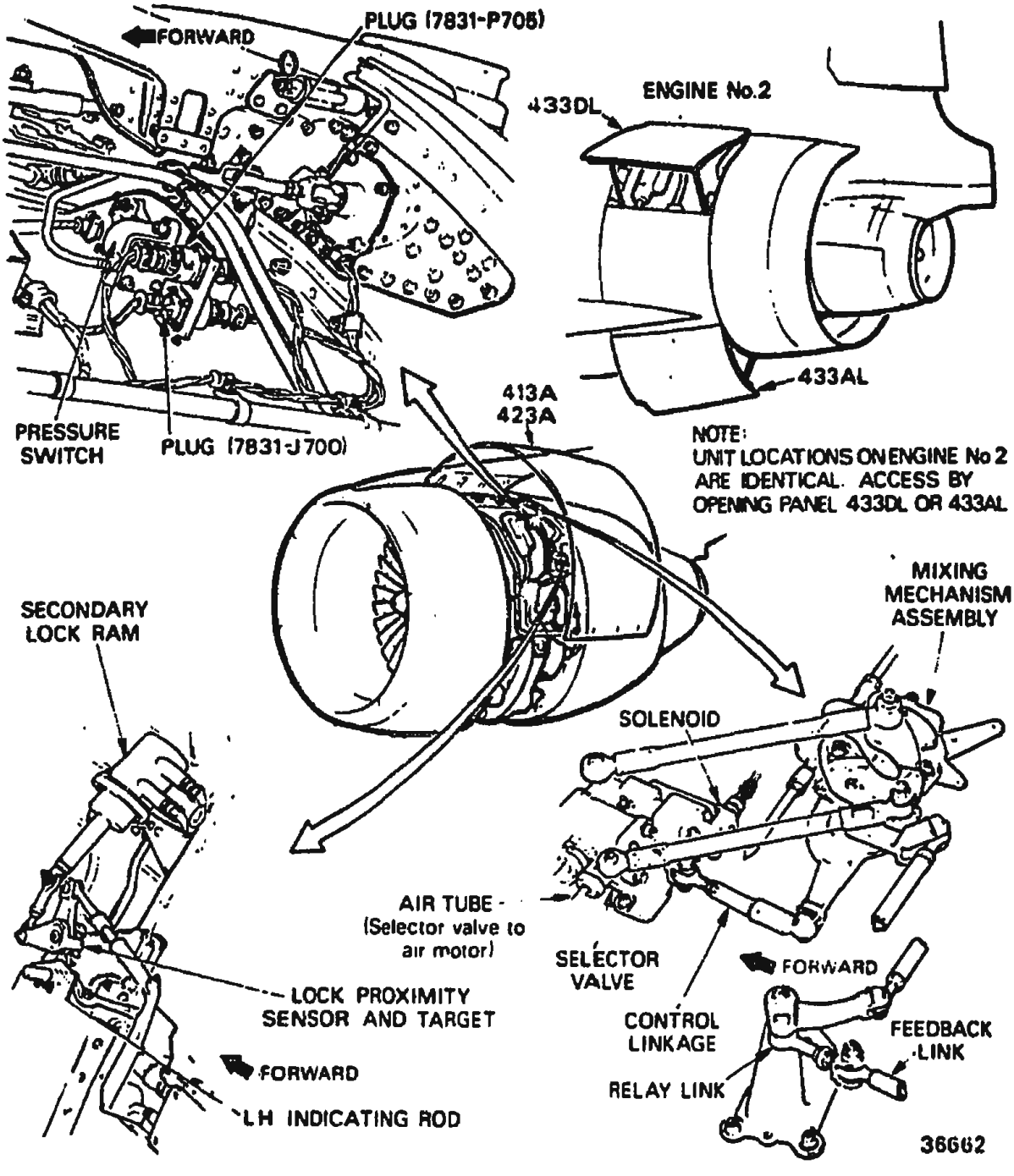
TABLE 101

FIGURE	TITLE
103	Not used
104	REVERSER IN TRANSIT light ON other light OFF when reverse thrust cancelled
105	REVERSER OPERATING light ON - other light OFF - thrust reverser retracted
106	REVERSER OPERATING and REVERSER IN TRANSIT lights ON - Thrust reverser partially extended/retracted
107	REVERSER OPERATING light ON, REVERSER IN TRANSIT light OFF - Reverse thrust lever at Forward Idle - Thrust reverser fails to retract

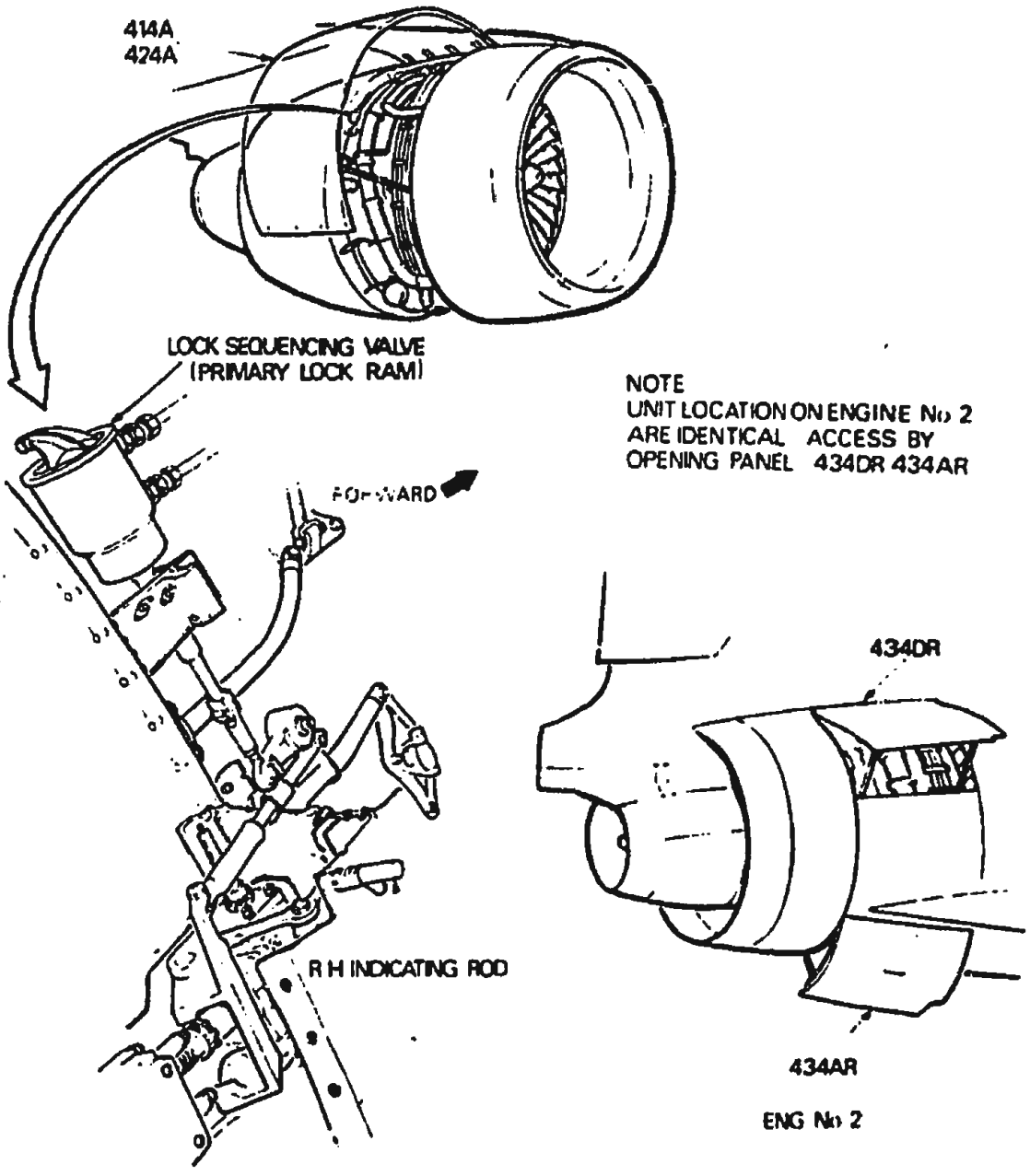
	108	REVERSER OPERATING and REVERSER IN TRANSIT lights ON - Thrust reverser does not operate when reverse thrust selected
	109	REVERSER IN TRANSIT light ON with system extended
	110	Thrust reverser does not operate from forward to reverse thrust - REVERSER OPERATING light ON - other light OFF
	111	Unable to achieve reverse thrust - all lights OFF
	112	REVERSER OPERATING light OFF during thrust reverser operation
	113	Unable to select reverse thrust
	114	REVERSER IN TRANSIT light ON, REVERSER OPERATING light OFF - Thrust reverser partially retracted
	115	Unable to increase power after selecting reverse thrust/forward thrust
	116	Thrust reverser cannot be manually cycled
R	117	Thrust reverser translating cowl jammed out of line
	SCHEM 1	Thrust Reverser Control System Schematic
	SCHEM 2	Thrust Reverser Indication System Schematic

COMPONENT	QTY	ACCESS/AREA	REFERENCE
BOX - FUEL FLOW REGULATOR CONTROL	3	ENGINE: 413A,423A,433AL	76-11-02
CABLE - THROTTLE	3	ENGINE: 413A,423A,433AL 414A,424A,434AR/DR	76-11-02
DRIVE - FLEXIBLE	6	ENGINE: 412,422,432	78-31-08
GEARBOX - FEEDBACK	3	ENGINE: 412,422,432	78-31-17
LINK - FEEDBACK CONTROL	3	ENGINE: 413A,423A,433DL	76-11-00
LINK - TRANSLATING COWL FEEDBACK	3	ENGINE: 413A,423A,433DL	76-11-00
LINKAGE - SELECTOR VALVE	3	ENGINE: 413A,423A,433DL	76-11-00
MOTOR - AIR	3	ENGINE: 412,422,432	78-31-03
RAM - PRIMARY LOCK	3	ENGINE: 414A,424A,434DR	78-31-35
RAM - SECONDARY LOCK	3	ENGINE: 413A,423A,433DL	78-31-43
SENSOR - EXTEND PROXIMITY	3	ENGINE: 412,422,432	78-31-50
SENSOR - PRESSURE SWITCH	3	ENGINE: 413A,423A,433DL	78-31-38
SENSOR - STOW	3	ENGINE: 412,422,432	78-31-51
SENSOR - SECONDARY LOCK	3	ENGINE: 413A,423A,433DL	78-31-37
SWITCH - PRESSURE	3	ENGINE: 413A,423A,433DL	78-31-38
SWITCH - THRUST REVERSER	3	PILOTS PEDESTAL: ZONE 210	76-11-06
VALVE - PRESSURE REGULATING AND SHUT-OFF	3	ENGINE: 412,422,432	78-31-02
VALVE - SELECTOR	3	ENGINE: 413A,423A,433DL	78-31-01
VALVE - LOCK SEQUENCING	3	ENGINE: 414A,424A,434DR	78-31-35

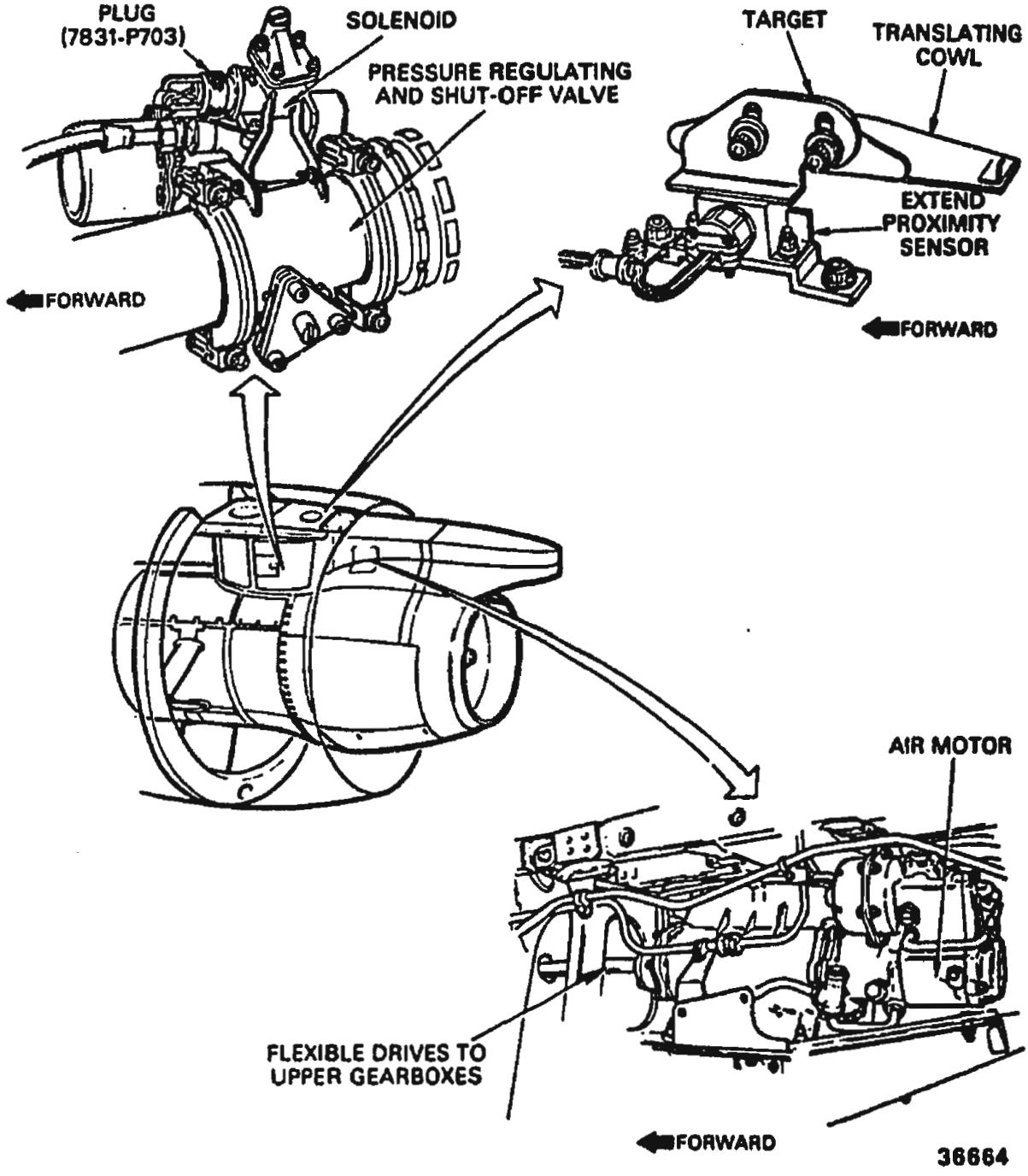
Component Location Index
Fig.101



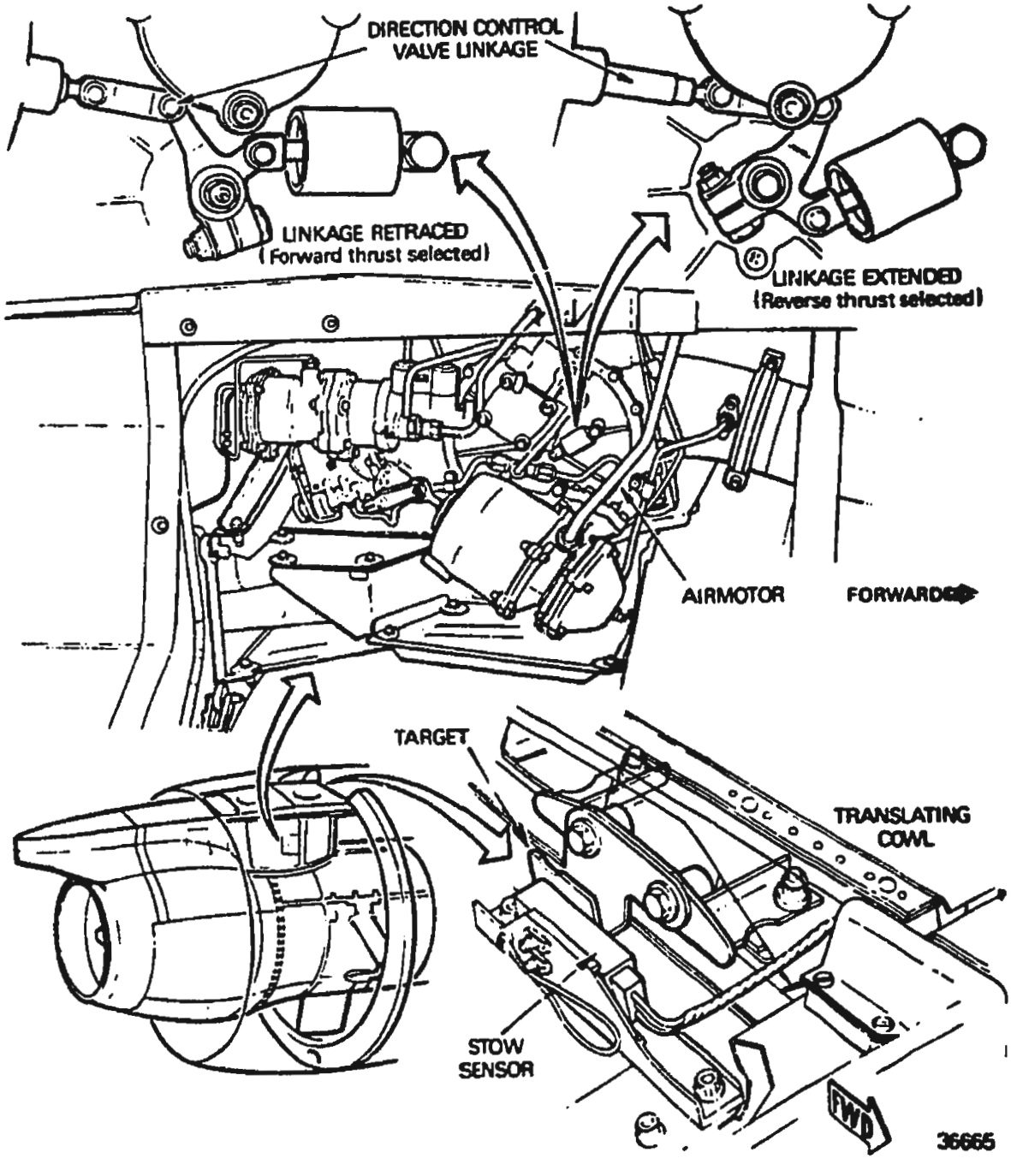
Component Location Diagram
Fig.102, Sheet 1 of 5



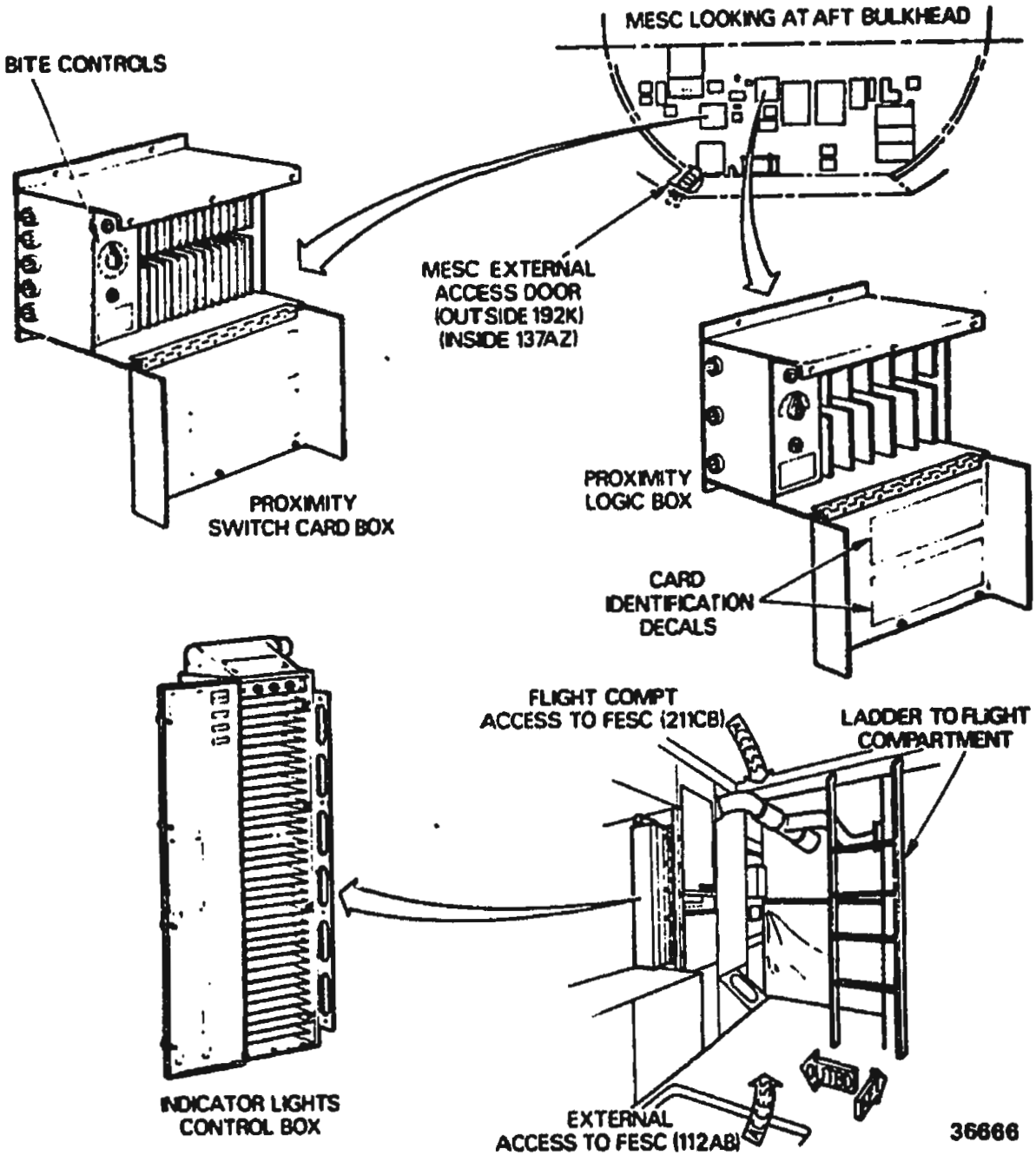
Component Location Diagram
Fig.102, Sheet 2 of 5



Component Location Diagram
Fig.102, Sheet 3 of 5



Component Location Diagram
Fig.102, Sheet 4 of 5


MESC LOOKING AT AFT BULKHEAD
BITE CONTROLS
MESC EXTERNAL ACCESS DOOR (OUTSIDE 192K) (INSIDE 137AZ)
PROXIMITY SWITCH CARD BOX
PROXIMITY LOGIC BOX
CARD IDENTIFICATION DECALS
FLIGHT COMPT ACCESS TO FESC (211CB)
LADDER TO FLIGHT COMPARTMENT
INDICATOR LIGHTS CONTROL BOX
EXTERNAL ACCESS TO FESC (112AB)
36666

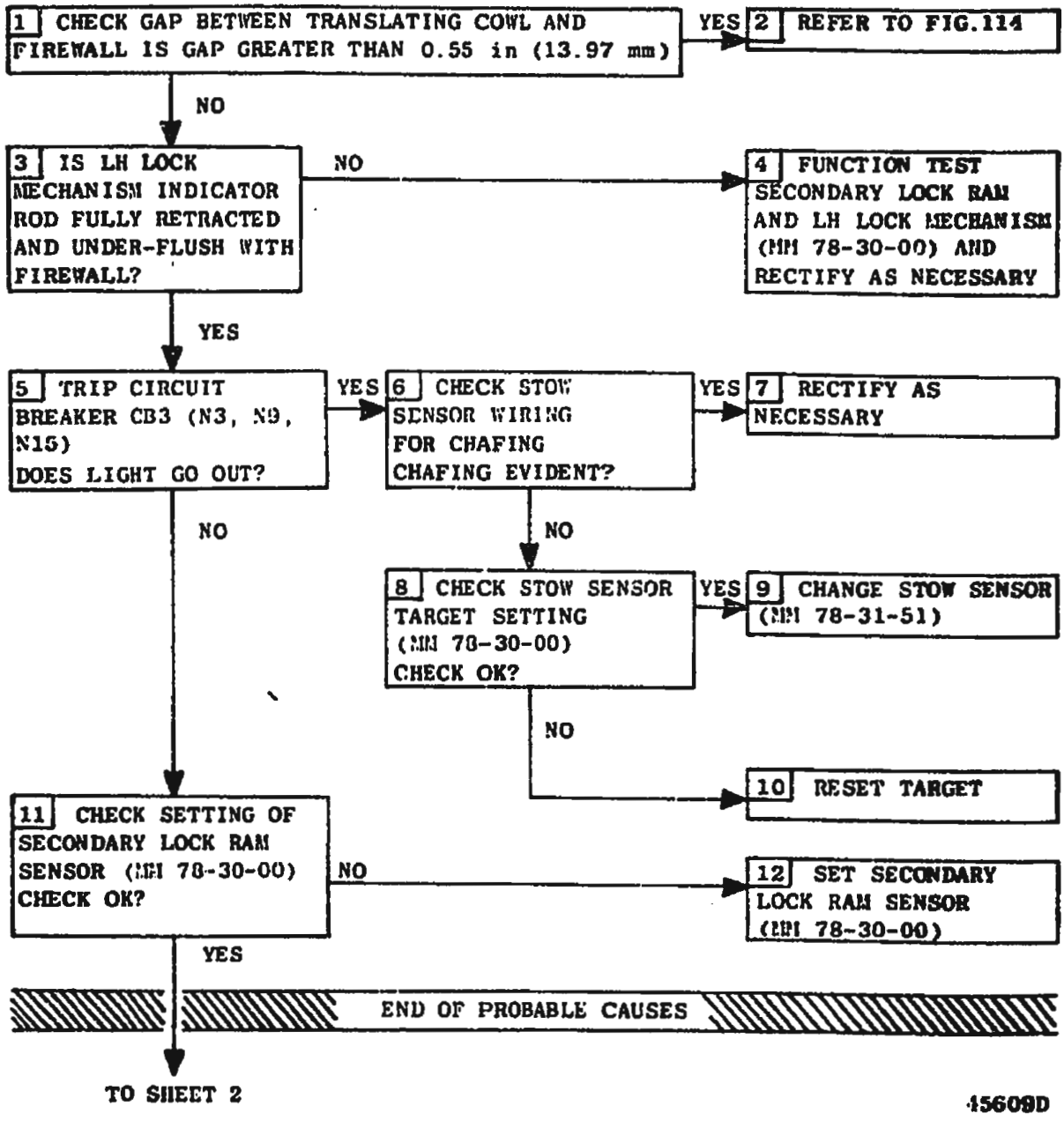
Component Location Diagram
Fig.102, Sheet 5 of 5

Fig.103 not used

Fig.103

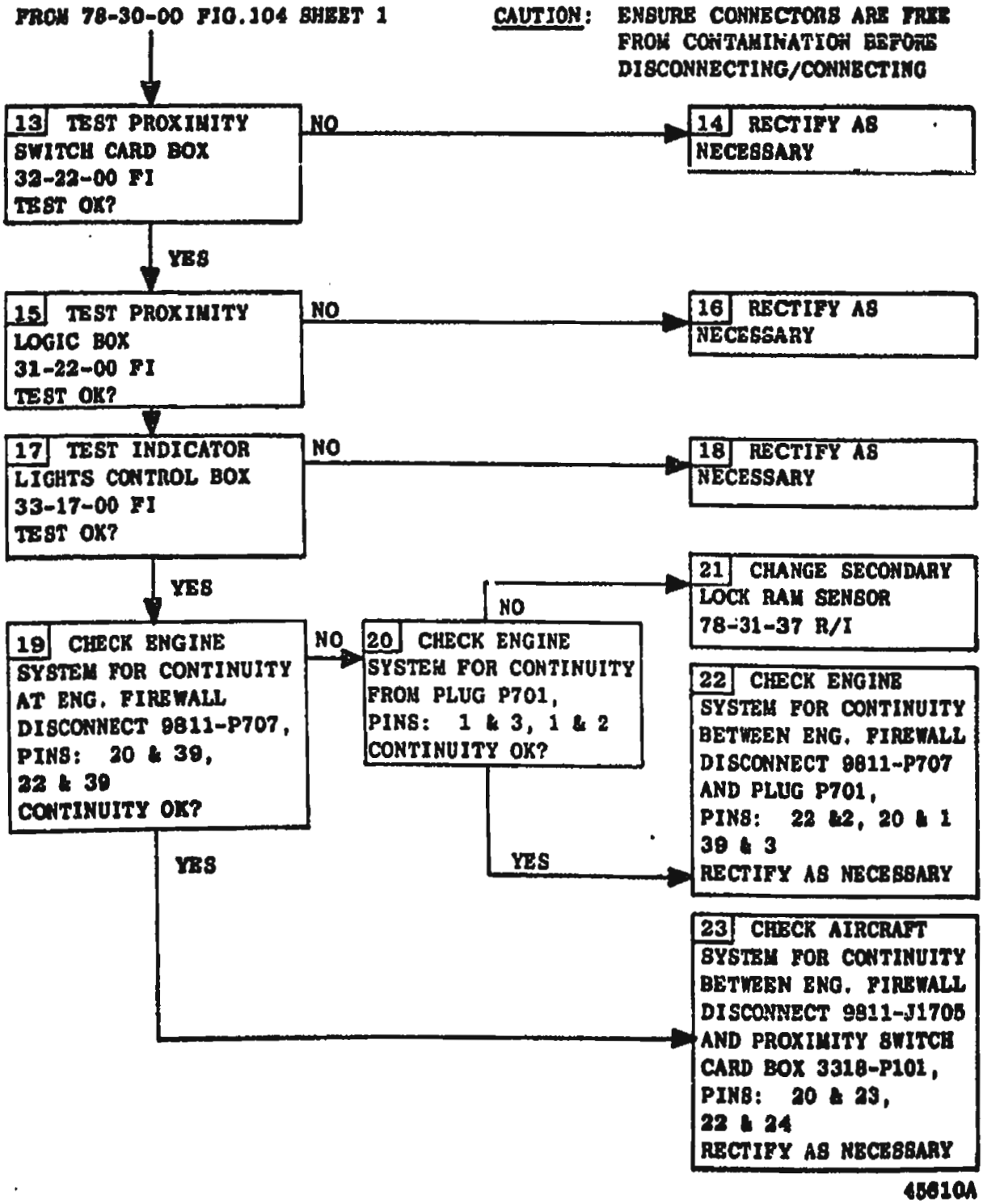
REVERSER UNLOCKED/UNSTOWED INDICATING LIGHT ON-OTHER LIGHTS OFF-REVERSE THRUST CANCELLED

PREREQUISITES: ELECTRICAL POWER (24-00-00)


1 CHECK GAP BETWEEN TRANSLATING COWL AND FIREWALL IS GAP GREATER THAN 0.55 in (13.97 mm)
YES
2 REFER TO FIG.114
NO
3 IS LH LOCK MECHANISM INDICATOR ROD FULLY RETRACTED AND UNDER-FLUSH WITH FIREWALL?
NO
4 FUNCTION TEST SECONDARY LOCK RAM AND LH LOCK MECHANISM (MM 78-30-00) AND RECTIFY AS NECESSARY
YES
5 TRIP CIRCUIT BREAKER CB3 (N3, N9, N15) DOES LIGHT GO OUT?
YES
6 CHECK STOW SENSOR WIRING FOR CHAFING CHAFING EVIDENT?
YES
7 RECTIFY AS NECESSARY
NO
NO
8 CHECK STOW SENSOR TARGET SETTING (MM 78-30-00) CHECK OK?
YES
9 CHANGE STOW SENSOR (MM 78-31-51)
NO
10 RESET TARGET
11 CHECK SETTING OF SECONDARY LOCK RAM SENSOR (MM 78-30-00) CHECK OK?
NO
12 SET SECONDARY LOCK RAM SENSOR (MM 78-30-00)
YES
END OF PROBABLE CAUSES
TO SHEET 2

15609D

R REVERSER IN TRANSIT light ON, other light OFF when
R reverse thrust cancelled
R Fig.104, Sheet 1 of 2


FROM 78-30-00 FIG.104 SHEET 1
CAUTION: ENSURE CONNECTORS ARE FREE FROM CONTAMINATION BEFORE DISCONNECTING/CONNECTING
13 TEST PROXIMITY SWITCH CARD BOX 32-22-00 FI TEST OK?
NO
14 RECTIFY AS NECESSARY
YES
15 TEST PROXIMITY LOGIC BOX 31-22-00 FI TEST OK?
NO
16 RECTIFY AS NECESSARY
17 TEST INDICATOR LIGHTS CONTROL BOX 33-17-00 FI TEST OK?
NO
18 RECTIFY AS NECESSARY
YES
19 CHECK ENGINE SYSTEM FOR CONTINUITY AT ENG. FIREWALL DISCONNECT 9811-P707, PINS: 20 & 39, 22 & 39 CONTINUITY OK?
NO
20 CHECK ENGINE SYSTEM FOR CONTINUITY FROM PLUG P701, PINS: 1 & 3, 1 & 2 CONTINUITY OK?
NO
21 CHANGE SECONDARY LOCK RAM SENSOR 78-31-37 R/I
YES
22 CHECK ENGINE SYSTEM FOR CONTINUITY BETWEEN ENG. FIREWALL DISCONNECT 9811-P707 AND PLUG P701, PINS: 22 &2, 20 & 1 39 & 3 RECTIFY AS NECESSARY
YES
23 CHECK AIRCRAFT SYSTEM FOR CONTINUITY BETWEEN ENG. FIREWALL DISCONNECT 9811-J1705 AND PROXIMITY SWITCH CARD BOX 3318-P101, PINS: 20 & 23, 22 & 24 RECTIFY AS NECESSARY
45610A

R REVERSER IN TRANSIT light ON, other light OFF when
R reverse thrust cancelled
R Fig.104, Sheet 2 of 2

C 1. Thrust Reverser Pressure Light "ON" and Air Motor Overheats

C A. A pressure light indication with reverse thrust not selected
C continues to be a major thrust reverser operating problem.
C The purpose of this MSL is to reiterate the functional and
C troubleshooting aspects related to this problem.

C B. In addition to pressure light indication, there is also the
C associated problem of overheated air motors. This results
C from the Pressure Regulating and Shut Off Valve (PRSOV)
C remaining open for long periods, at higher than ground idle
C conditions, allowing high temperature air to flow through
C a non-operating air motor.

C C. A reverser pressure light indication when thrust reverser
C has not been selected can be interpreted as follows:

C (1) The PRSOV is open with the ducting to the thrust
C reverser air motor pressurized, and the translating
C cowl stowed with locks engaged.

C (2) The PRSOV is open with the ducting to the thrust
C reverser air motor pressurized and the primary lock
C sequence valve not retracted, thus providing a pneumatic
C override signal to the PRSOV.

C (3) A pressure switch or electrical fault (i.e. PRSOV
C closed and ducting to air motor unpressurized).

C D. When troubleshooting pressure light problems, a number of
C checks are instructed. These are important for the following
C reasons.

C (1) Check 1: Check that RH lock mechanism indicator rod is
C fully retracted. This is to ensure that the primary
C lock ram (lock sequencing valve) is fully retracted.

C REVERSER OPERATING light ON - other light OFF -
C thrust reverser retracted
CR Fig.105, Sheet 1 of 6

C NOTE: This is important as the PRSOV is held open
C during the thrust reverser retract cycle by a
C pneumatic override signal and sequenced through
C the primary lock ram from a tapping on the HP air
C ducting. The signal is cancelled when the
C primary lock is retracted (See Maintenance Manual
C 78-30-00. Actuation System, Description).
C Therefore, if the primary lock ram does not
C retract upon completion of the reverser cycle,
C it will continue to sequence the PRSOV open. It
C is important to check all features of the lock
C mechanism as a fault or stiction in any part
C could cause the primary ram to be held in a
C partially extended position. Incorrect
C adjustment of primary ram linkage will also
C produce the same effect.

C (2) Check 2: Remove coverplate from PRSOV and check that
C valve is closed. If PRSOV is not closed and the primary
C lock ram has been checked satisfactory as per Check 1,
C this indicates a fault in either the PRSOV or an
C electrical problem.

C (3) Check 3: Check engine and aircraft electrics. A
C chafed electrical wire will cause the light to come on.

CR (4) Check 4: Check pressure switch. A faulty proximity
C sensor or harness could cause the light to come on.

C NOTE: Sticking of the primary lock ram mechanism is a
C well-identified cause of "pressure light on"
C problems; although it has been established that
C under certain circumstances, the lock body
C (IPC 78-31-36, Fig. 1, Item 005) can contact and
C operate the lock yoke (IPC 78-31-36, Fig. 1,
C Item 200) thus opening the primary ram, resulting
C in an override signal to the PRSOV. This can
C only occur when air motor travel is beyond the
C maximum permitted limits or if the translating
C cowl is incorrectly rigged (See Maintenance
C Manual 78-30-00).

C REVERSER OPERATING light ON - other light OFF -
C thrust reverser retracted
CR Fig.105, Sheet 2 of 6

C E. Visual indications of this problem are as follows:

C NOTE: It is necessary to manually cycle the translating cowl
C towards reverse thrust position (See Maintenance
C Manual, 78-30-00).

C (1) There will be frettage marks where the lock body arm
C contacts the lock yoke.

C (2) There may be impact marks from the ballnut housing bolts
C and nuts on the gearbox housing.

C (3) The translating cowl rigging gap may be too small (i.e.
C the cowl will probably be hard on the firewall).

C (4) The firewall and pressure cylinder may be cracked and
C damaged.

C (5) The air motor may be overheated. Check decal.

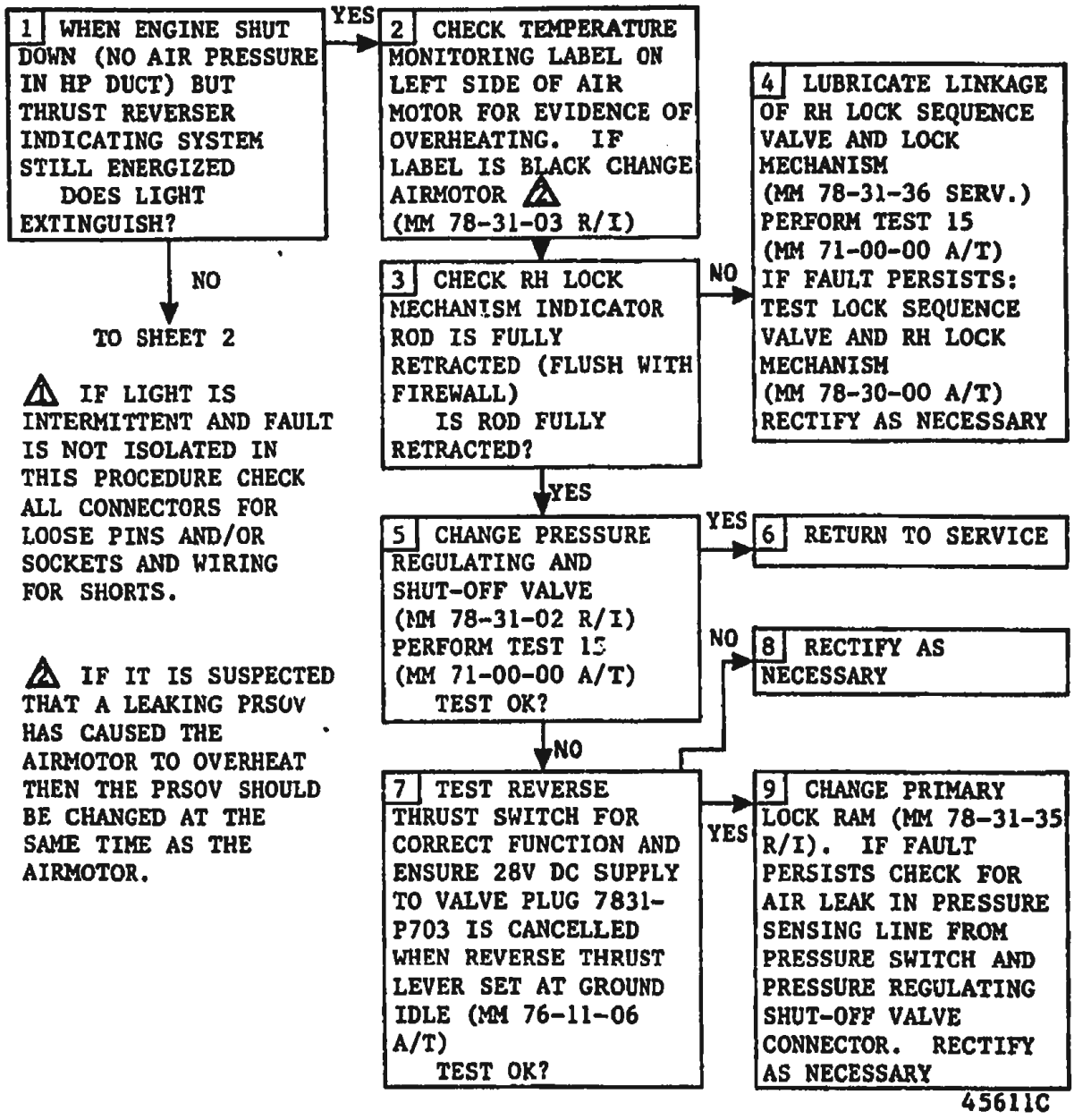
C (6) The position of the thrust reverser lock indication
C pin - The indicator pin is operated by the lock yoke and
C provides visual indication of lock mechanism position.

C NOTE: It has been established that this is not an
C accurate indication, and investigations have
C shown that in an extreme case the primary ram
C could be in an override signal position
C partially extended) with the indicator pin
C flush with the firewall. It is, therefore,
C recommended when investigating pressure light
C problems, that the right-hand hinged cowl is
C raised and a positive check made to establish
C that primary ram is fully retracted. Under these
C circumstances, it is necessary to resolve the
C basic problem of air motor over travel or
C incorrect rigging.

C REVERSER OPERATING light ON - other light OFF -
C thrust reverser retracted
CR Fig.105, Sheet 3 of 6

THRUST REVERSER PRESSURE INDICATING LIGHT ON WITH REVERSER RETRACTED ⚠

PREREQUISITES: ELECTRICAL POWER (MM 24-00-00)

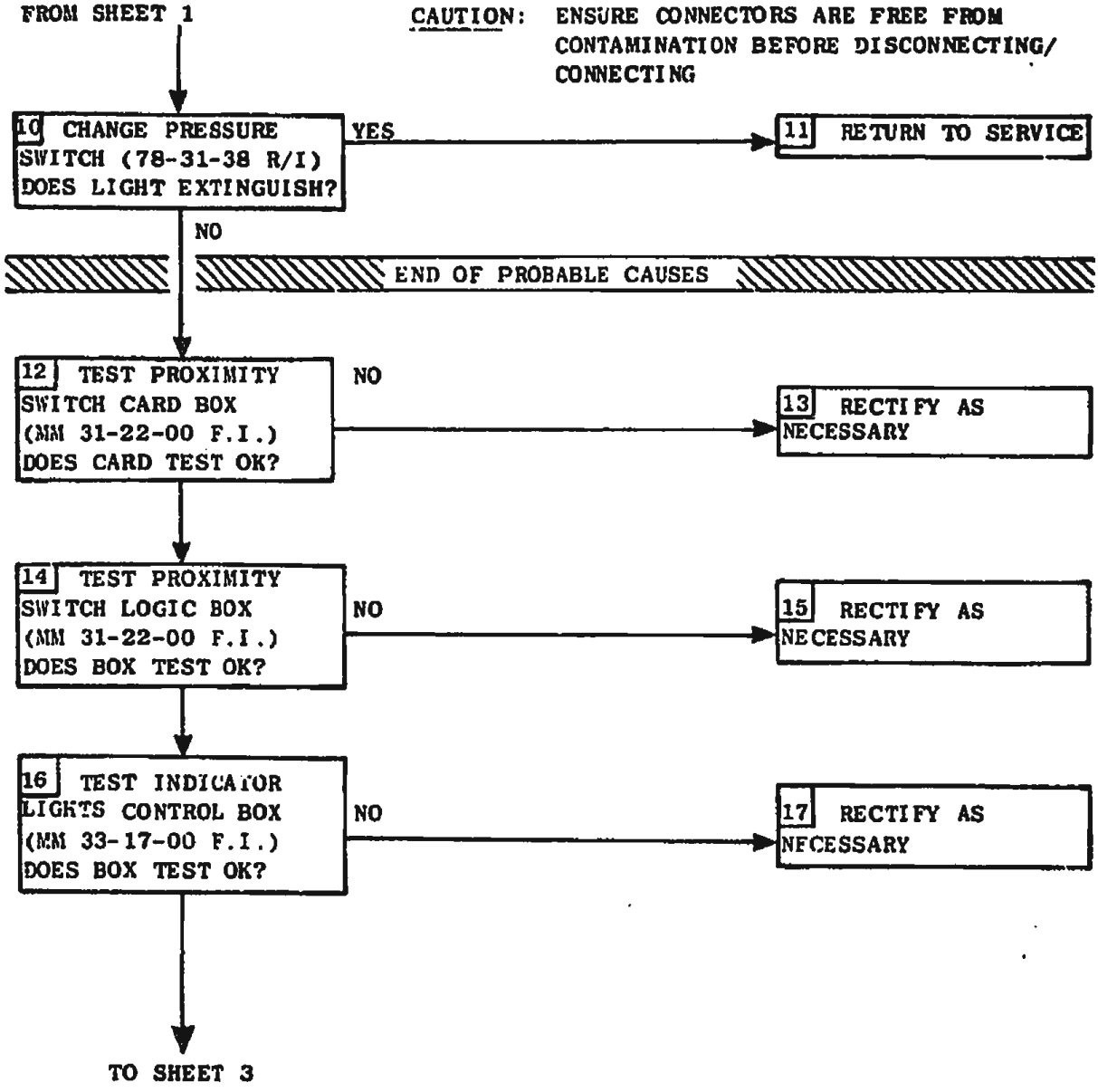

1 WHEN ENGINE SHUT DOWN (NO AIR PRESSURE IN HP DUCT) BUT THRUST REVERSER INDICATING SYSTEM STILL ENERGIZED DOES LIGHT EXTINGUISH?
YES
NO
TO SHEET 2
2 CHECK TEMPERATURE MONITORING LABEL ON LEFT SIDE OF AIR MOTOR FOR EVIDENCE OF OVERHEATING. IF LABEL IS BLACK CHANGE AIRMOTOR ⚠ (MM 78-31-03 R/I)
3 CHECK RH LOCK MECHANISM INDICATOR ROD IS FULLY RETRACTED (FLUSH WITH FIREWALL) IS ROD FULLY RETRACTED?
NO
4 LUBRICATE LINKAGE OF RH LOCK SEQUENCE VALVE AND LOCK MECHANISM (MM 78-31-36 SERV.) PERFORM TEST 15 (MM 71-00-00 A/T) IF FAULT PERSISTS: TEST LOCK SEQUENCE VALVE AND RH LOCK MECHANISM (MM 78-30-00 A/T) RECTIFY AS NECESSARY
YES
5 CHANGE PRESSURE REGULATING AND SHUT-OFF VALVE (MM 78-31-02 R/I) PERFORM TEST 15 (MM 71-00-00 A/T) TEST OK?
YES
6 RETURN TO SERVICE
NO
8 RECTIFY AS NECESSARY
NO
7 TEST REVERSE THRUST SWITCH FOR CORRECT FUNCTION AND ENSURE 28V DC SUPPLY TO VALVE PLUG 7831-P703 IS CANCELLED WHEN REVERSE THRUST LEVER SET AT GROUND IDLE (MM 76-11-06 A/T) TEST OK?
YES
9 CHANGE PRIMARY LOCK RAM (MM 78-31-35 R/I). IF FAULT PERSISTS CHECK FOR AIR LEAK IN PRESSURE SENSING LINE FROM PRESSURE SWITCH AND PRESSURE REGULATING SHUT-OFF VALVE CONNECTOR. RECTIFY AS NECESSARY

45611C

⚠ IF LIGHT IS INTERMITTENT AND FAULT IS NOT ISOLATED IN THIS PROCEDURE CHECK ALL CONNECTORS FOR LOOSE PINS AND/OR SOCKETS AND WIRING FOR SHORTS.

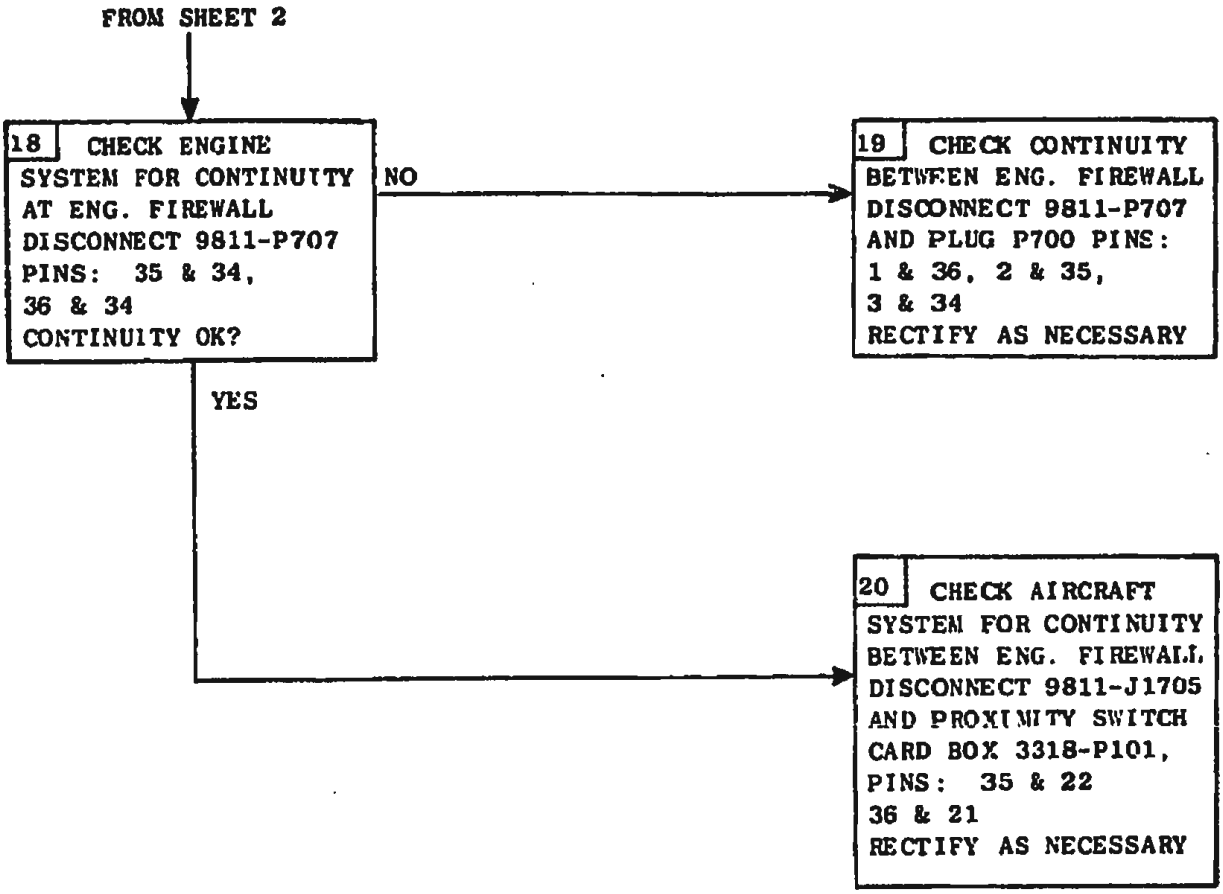
⚠ IF IT IS SUSPECTED THAT A LEAKING PRSOV HAS CAUSED THE AIRMOTOR TO OVERHEAT THEN THE PRSOV SHOULD BE CHANGED AT THE SAME TIME AS THE AIRMOTOR.

R REVERSER OPERATING light ON - other light OFF -
R thrust reverser retracted
R Fig.105, Sheet 4 of 6


FROM SHEET 1
CAUTION: ENSURE CONNECTORS ARE FREE FROM CONTAMINATION BEFORE DISCONNECTING/ CONNECTING
10 CHANGE PRESSURE SWITCH (78-31-38 R/I) DOES LIGHT EXTINGUISH?
YES
11 RETURN TO SERVICE
NO
END OF PROBABLE CAUSES
12 TEST PROXIMITY SWITCH CARD BOX (MM 31-22-00 F.I.) DOES CARD TEST OK?
NO
13 RECTIFY AS NECESSARY
14 TEST PROXIMITY SWITCH LOGIC BOX (MM 31-22-00 F.I.) DOES BOX TEST OK?
NO
15 RECTIFY AS NECESSARY
16 TEST INDICATOR LIGHTS CONTROL BOX (MM 33-17-00 F.I.) DOES BOX TEST OK?
NO
17 RECTIFY AS NECESSARY
TO SHEET 3

45612B

R REVERSER OPERATING light ON - other light OFF - thrust reverser retracted
R Fig.105, Sheet 5 of 6

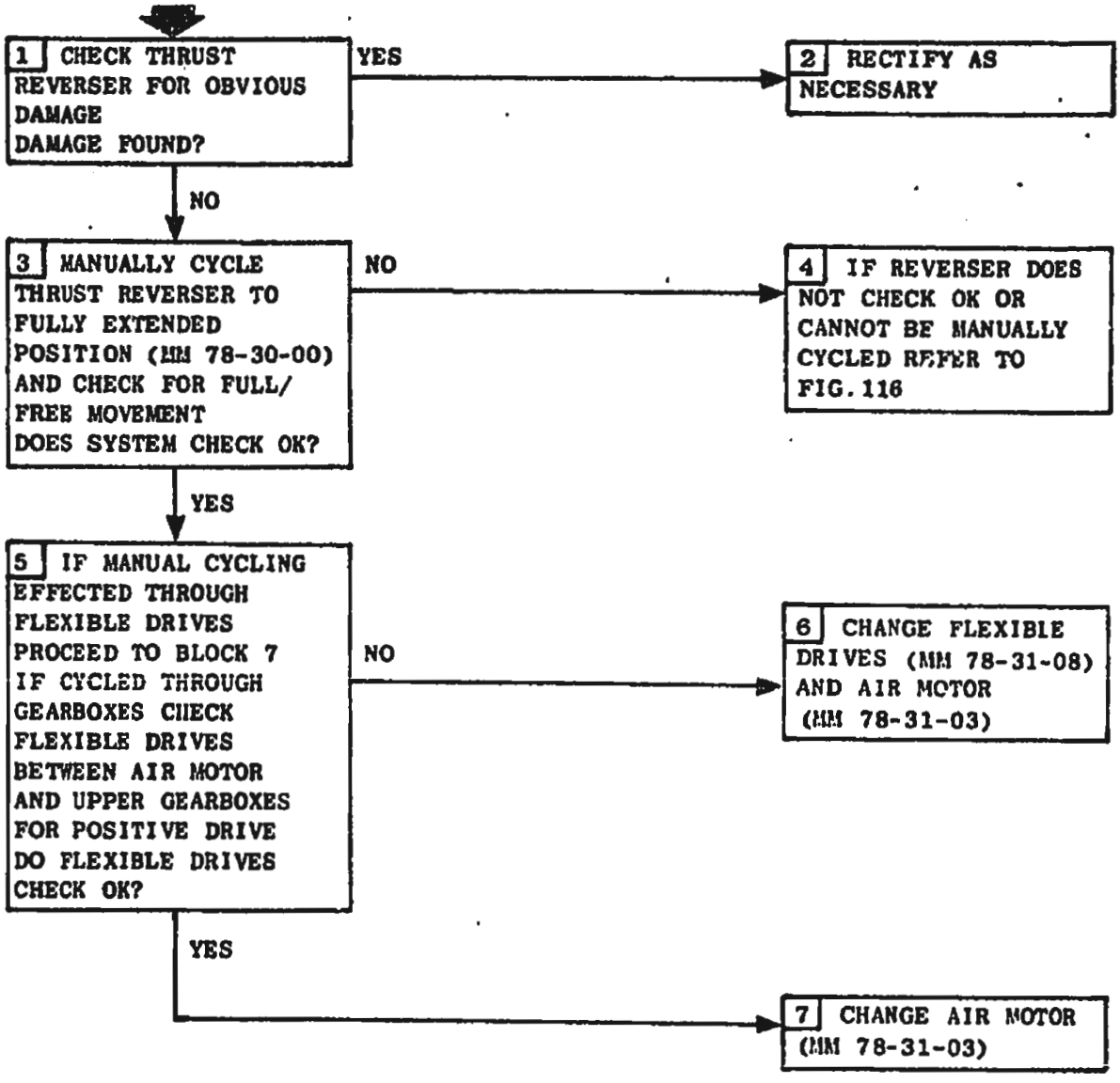

FROM SHEET 2
18 CHECK ENGINE SYSTEM FOR CONTINUITY AT ENG. FIREWALL DISCONNECT 9811-P707 PINS: 35 & 34, 36 & 34 CONTINUITY OK?
NO
19 CHECK CONTINUITY BETWEEN ENG. FIREWALL DISCONNECT 9811-P707 AND PLUG P700 PINS: 1 & 36, 2 & 35, 3 & 34 RECTIFY AS NECESSARY
YES
20 CHECK AIRCRAFT SYSTEM FOR CONTINUITY BETWEEN ENG. FIREWALL DISCONNECT 9811-J1705 AND PROXIMITY SWITCH CARD BOX 3318-P101, PINS: 35 & 22 36 & 21 RECTIFY AS NECESSARY

79765A

R REVERSER OPERATING light ON - other light OFF -
R thrust reverser retracted
R Fig.105, Sheet 6 of 6

THRUST REVERSER PARTIALLY EXTENDED/RETRACTED-
REVERSER PRESSURE INDICATED (LIGHT REMAINED
ILLUMINATED)

PREREQUISITES: NONE

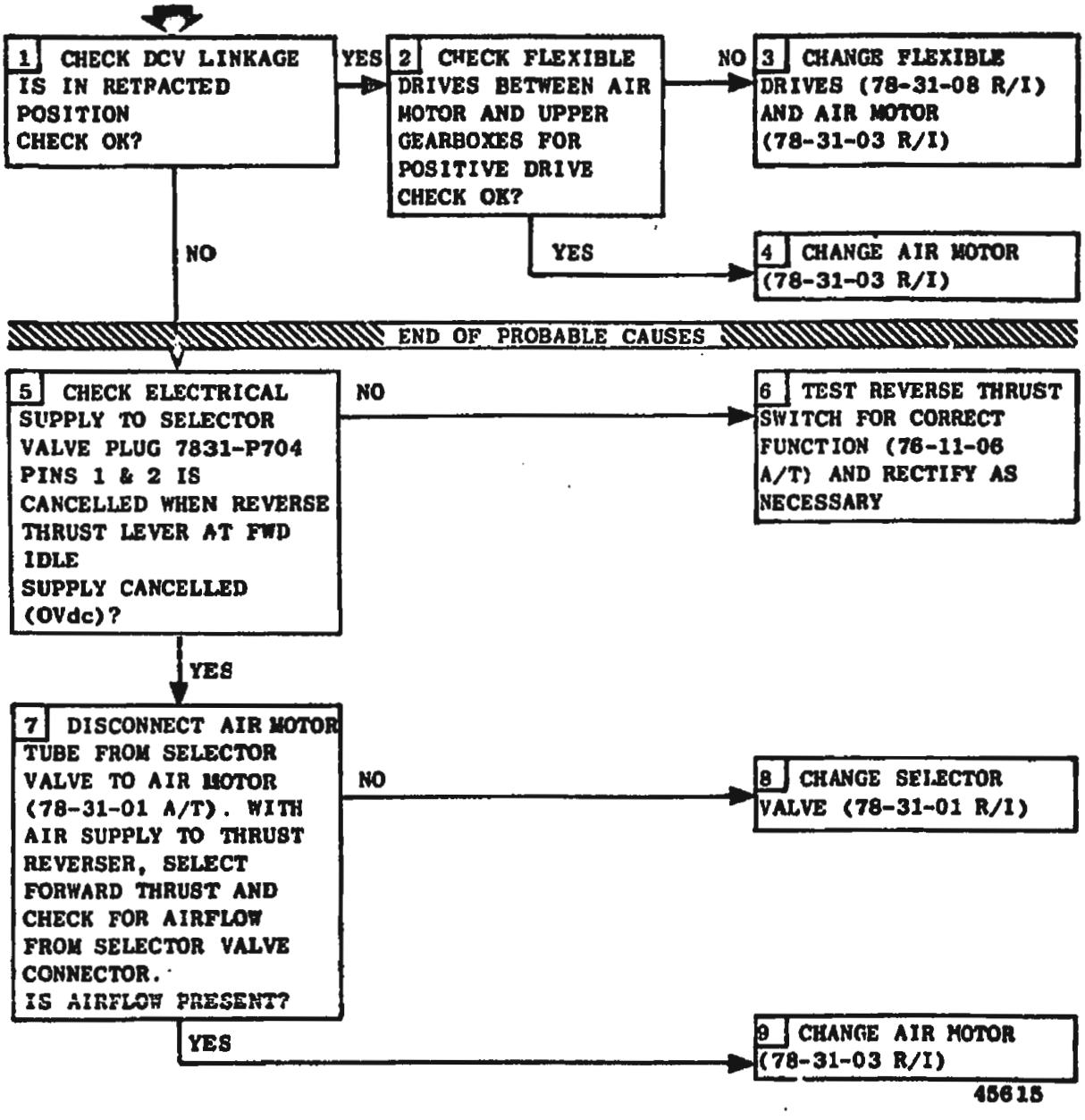

1 CHECK THRUST REVERSER FOR OBVIOUS DAMAGE
DAMAGE FOUND?
YES
2 RECTIFY AS NECESSARY
NO
3 MANUALLY CYCLE THRUST REVERSER TO FULLY EXTENDED POSITION (MM 78-30-00) AND CHECK FOR FULL/ FREE MOVEMENT
DOES SYSTEM CHECK OK?
NO
4 IF REVERSER DOES NOT CHECK OK OR CANNOT BE MANUALLY CYCLED REFER TO FIG. 116
YES
5 IF MANUAL CYCLING EFFECTED THROUGH FLEXIBLE DRIVES PROCEED TO BLOCK 7 IF CYCLED THROUGH GEARBOXES CHECK FLEXIBLE DRIVES BETWEEN AIR MOTOR AND UPPER GEARBOXES FOR POSITIVE DRIVE
DO FLEXIBLE DRIVES CHECK OK?
NO
6 CHANGE FLEXIBLE DRIVES (MM 78-31-08) AND AIR MOTOR (MM 78-31-03)
YES
7 CHANGE AIR MOTOR (MM 78-31-03)

45613A

REVERSER OPERATING and REVERSER IN TRANSIT lights ON -
Thrust reverser partially extended/retracted
Fig.106

THRUST REVERSER FAILS TO RETRACT
REVERSER THRUST LEVER AT FORWARD IDLE

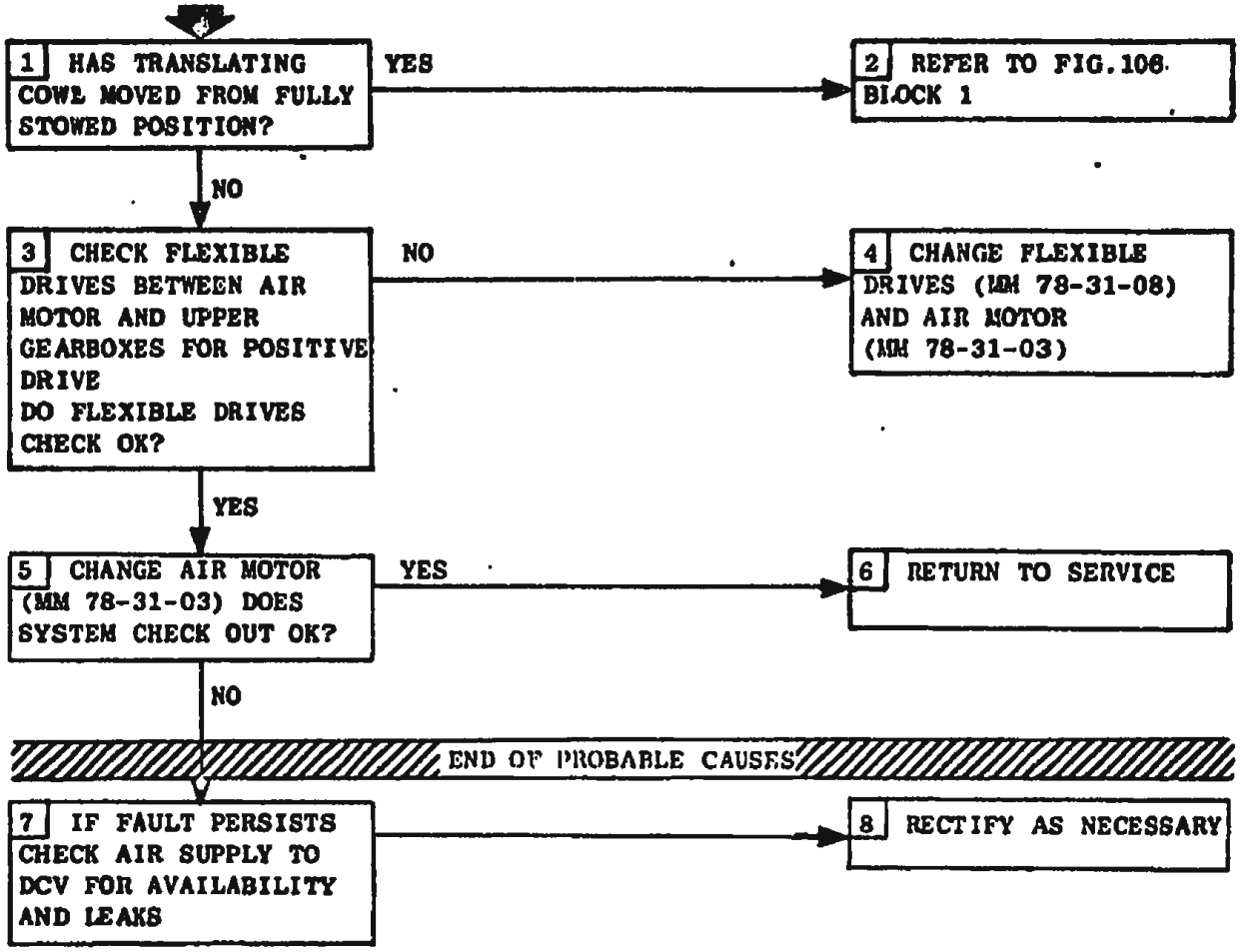
PREREQUISITES:
PNEUMATIC POWER (MM 36-00-00)


1 CHECK DCV LINKAGE IS IN RETRACTED POSITION CHECK OK?
YES
2 CHECK FLEXIBLE DRIVES BETWEEN AIR MOTOR AND UPPER GEARBOXES FOR POSITIVE DRIVE CHECK OK?
NO
3 CHANGE FLEXIBLE DRIVES (78-31-08 R/I) AND AIR MOTOR (78-31-03 R/I)
NO
YES
4 CHANGE AIR MOTOR (78-31-03 R/I)
END OF PROBABLE CAUSES
5 CHECK ELECTRICAL SUPPLY TO SELECTOR VALVE PLUG 7831-P704 PINS 1 & 2 IS CANCELLED WHEN REVERSE THRUST LEVER AT FWD IDLE SUPPLY CANCELLED (OVdc)?
NO
6 TEST REVERSE THRUST SWITCH FOR CORRECT FUNCTION (76-11-06 A/T) AND RECTIFY AS NECESSARY
YES
7 DISCONNECT AIR MOTOR TUBE FROM SELECTOR VALVE TO AIR MOTOR (78-31-01 A/T). WITH AIR SUPPLY TO THRUST REVERSER, SELECT FORWARD THRUST AND CHECK FOR AIRFLOW FROM SELECTOR VALVE CONNECTOR. IS AIRFLOW PRESENT?
NO
8 CHANGE SELECTOR VALVE (78-31-01 R/I)
YES
9 CHANGE AIR MOTOR (78-31-03 R/I)
45615

REVERSER OPERATING light ON, REVERSER IN TRANSIT light OFF -
Reverse thrust lever at Forward Idle -
Thrust reverser fails to retract

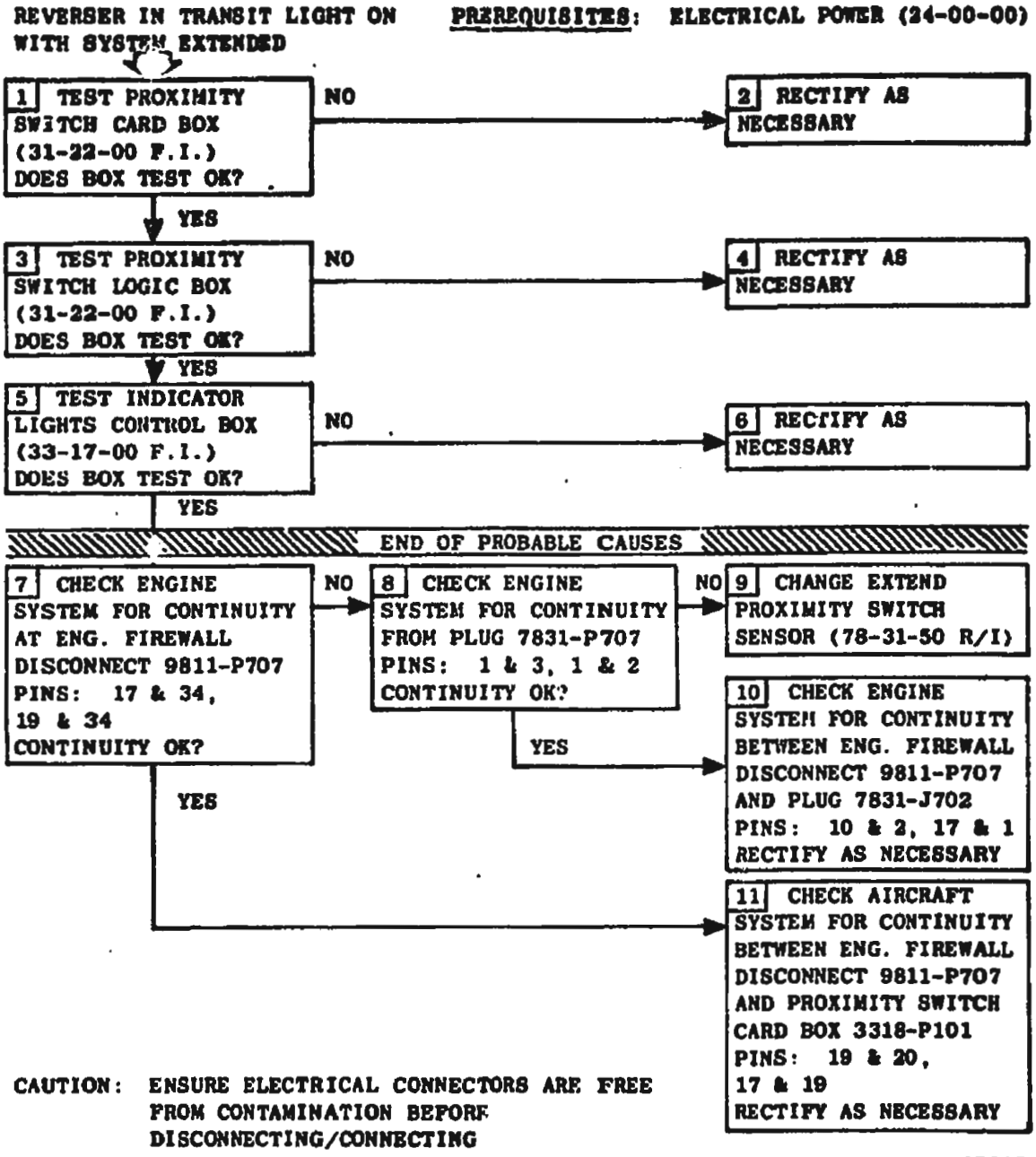
THRUST REVERSER DOES NOT OPERATE WHEN REVERSE THRUST SELECTED--PRESSURE AND UNLOCKED/UNSTOWED INDICATING LIGHTS ON

PREREQUISITES: NONE


1 HAS TRANSLATING COWL MOVED FROM FULLY STOWED POSITION?
YES
2 REFER TO FIG.106 BLOCK 1
NO
3 CHECK FLEXIBLE DRIVES BETWEEN AIR MOTOR AND UPPER GEARBOXES FOR POSITIVE DRIVE DO FLEXIBLE DRIVES CHECK OK?
NO
4 CHANGE FLEXIBLE DRIVES (MM 78-31-08) AND AIR MOTOR (MM 78-31-03)
YES
5 CHANGE AIR MOTOR (MM 78-31-03) DOES SYSTEM CHECK OUT OK?
YES
6 RETURN TO SERVICE
NO
END OF PROBABLE CAUSES
7 IF FAULT PERSISTS CHECK AIR SUPPLY TO DCV FOR AVAILABILITY AND LEAKS
8 RECTIFY AS NECESSARY

45618A

REVERSER OPERATING and REVERSER IN TRANSIT lights ON
- Thrust reverser does not operate when reverse thrust selected
Fig.108

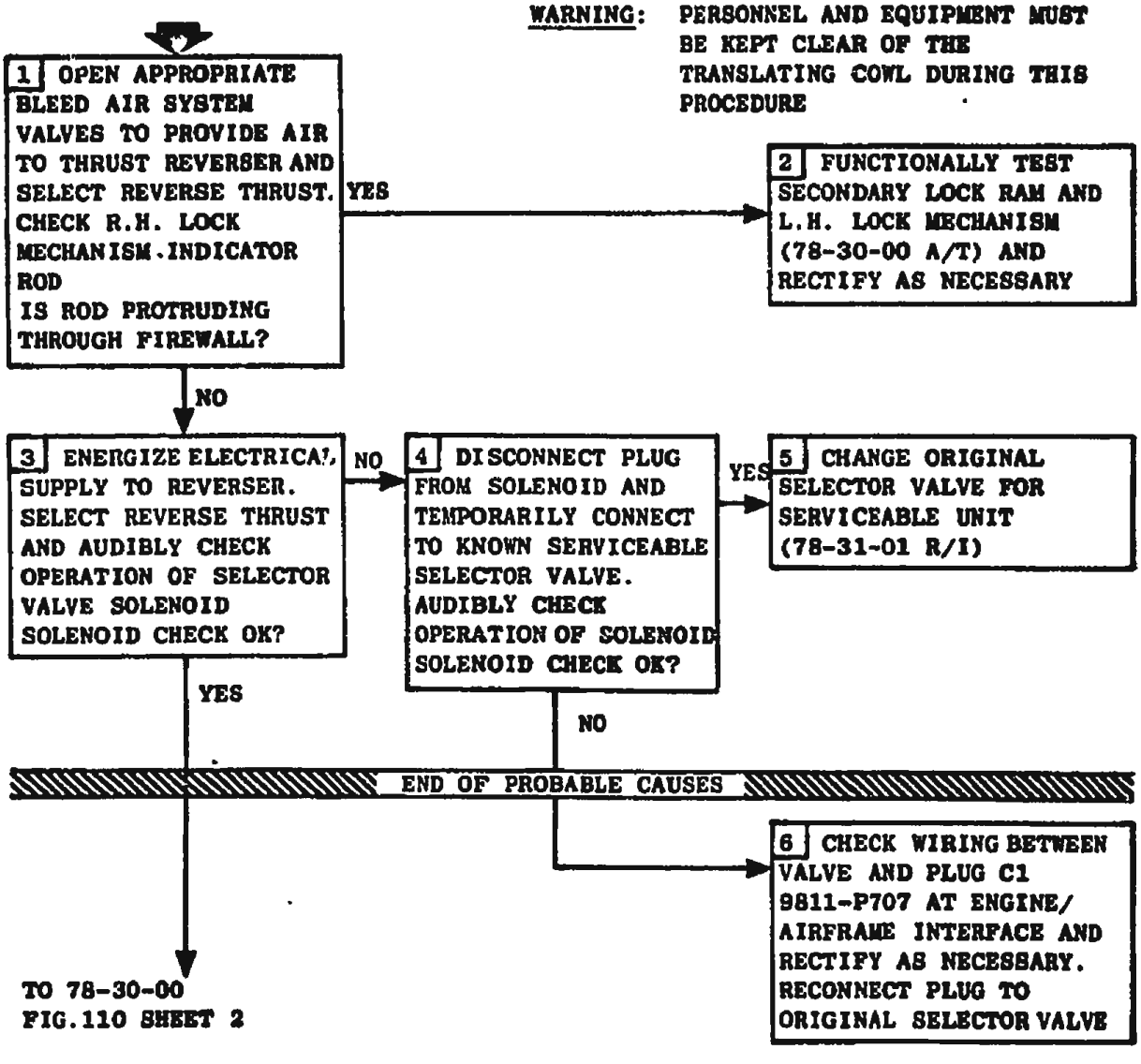

REVERSER IN TRANSIT LIGHT ON WITH SYSTEM EXTENDED
PREREQUISITES: ELECTRICAL POWER (24-00-00)
1 TEST PROXIMITY SWITCH CARD BOX (31-22-00 F.I.) DOES BOX TEST OK?
NO
2 RECTIFY AS NECESSARY
YES
3 TEST PROXIMITY SWITCH LOGIC BOX (31-22-00 F.I.) DOES BOX TEST OK?
NO
4 RECTIFY AS NECESSARY
YES
5 TEST INDICATOR LIGHTS CONTROL BOX (33-17-00 F.I.) DOES BOX TEST OK?
NO
6 RECTIFY AS NECESSARY
YES
END OF PROBABLE CAUSES
7 CHECK ENGINE SYSTEM FOR CONTINUITY AT ENG. FIREWALL DISCONNECT 9811-P707 PINS: 17 & 34, 19 & 34 CONTINUITY OK?
NO
8 CHECK ENGINE SYSTEM FOR CONTINUITY FROM PLUG 7831-P707 PINS: 1 & 3, 1 & 2 CONTINUITY OK?
NO
9 CHANGE EXTEND PROXIMITY SWITCH SENSOR (78-31-50 R/I)
YES
10 CHECK ENGINE SYSTEM FOR CONTINUITY BETWEEN ENG. FIREWALL DISCONNECT 9811-P707 AND PLUG 7831-J702 PINS: 10 & 2, 17 & 1 RECTIFY AS NECESSARY
YES
11 CHECK AIRCRAFT SYSTEM FOR CONTINUITY BETWEEN ENG. FIREWALL DISCONNECT 9811-P707 AND PROXIMITY SWITCH CARD BOX 3318-P101 PINS: 19 & 20, 17 & 19 RECTIFY AS NECESSARY
CAUTION: ENSURE ELECTRICAL CONNECTORS ARE FREE FROM CONTAMINATION BEFORE DISCONNECTING/CONNECTING
45618

REVERSER IN TRANSIT light ON with system extended
Fig.109

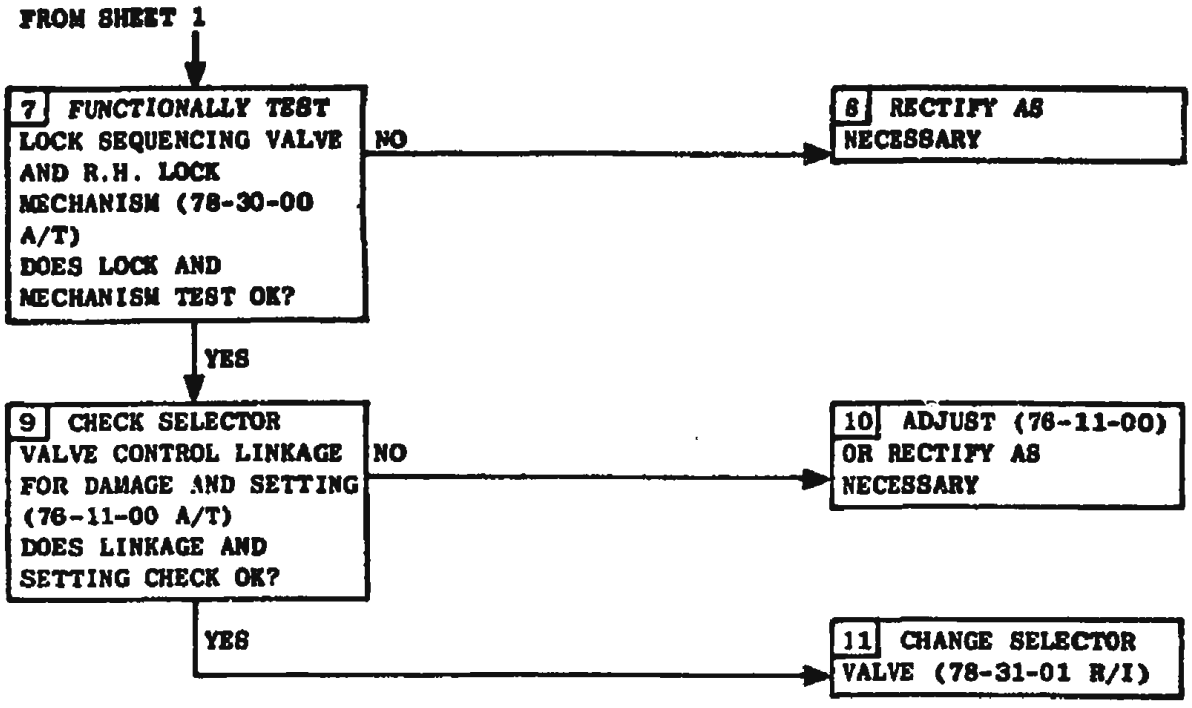
THRUST REVERSER DOES NOT OPERATE FROM FORWARD TO REVERSE THRUST - ONLY THRUST REVERSER PRESSURE INDICATING LIGHT ON

PREREQUISITES:
ELECTRICAL POWER (MM 24-00-00)
PNEUMATIC POWER (MM 36-00-00)

WARNING: PERSONNEL AND EQUIPMENT MUST BE KEPT CLEAR OF THE TRANSLATING COWL DURING THIS PROCEDURE

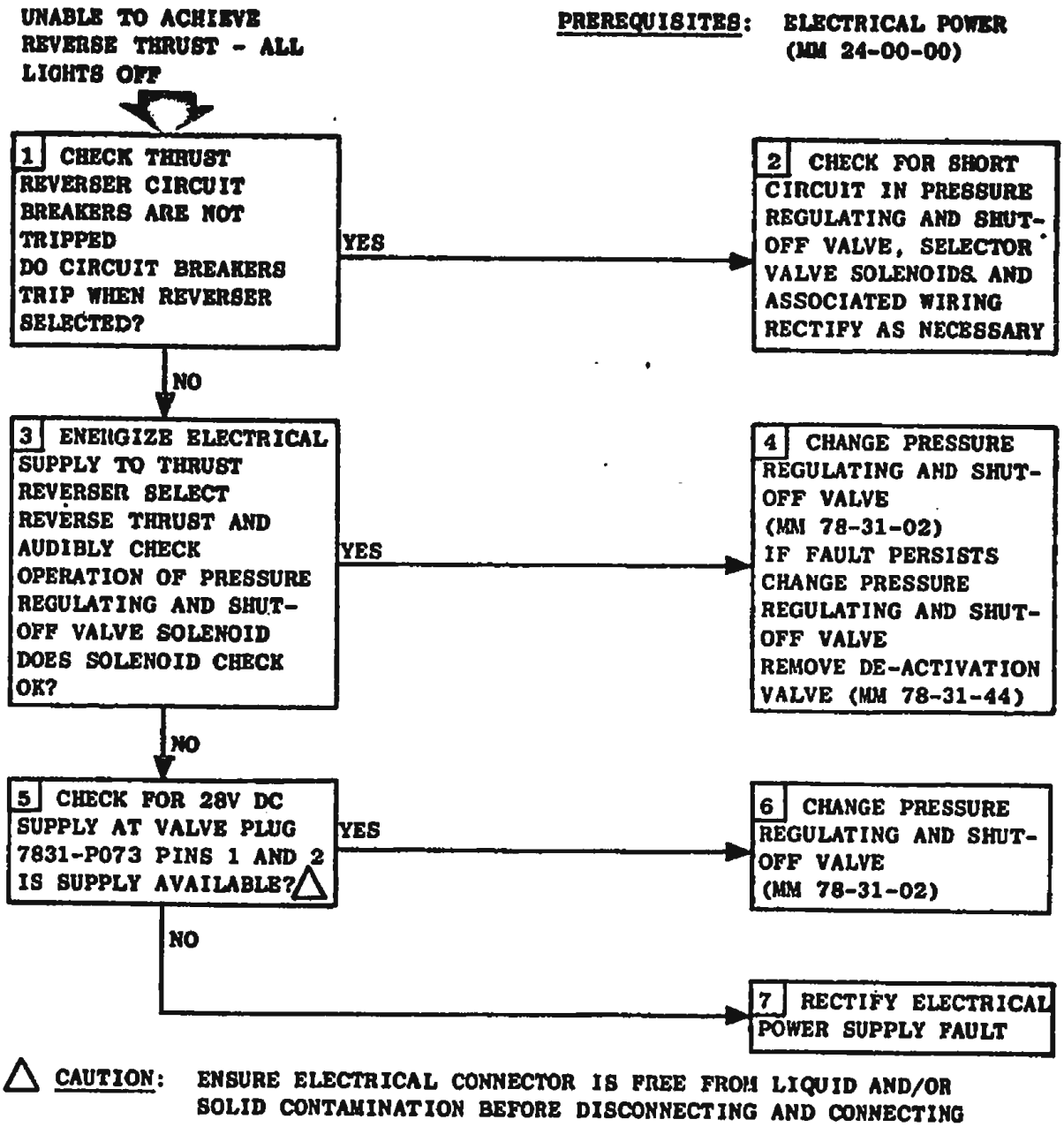

1 OPEN APPROPRIATE BLEED AIR SYSTEM VALVES TO PROVIDE AIR TO THRUST REVERSER AND SELECT REVERSE THRUST. CHECK R.H. LOCK MECHANISM INDICATOR ROD IS ROD PROTRUDING THROUGH FIREWALL?
YES
2 FUNCTIONALLY TEST SECONDARY LOCK RAM AND L.H. LOCK MECHANISM (78-30-00 A/T) AND RECTIFY AS NECESSARY
NO
3 ENERGIZE ELECTRICAL SUPPLY TO REVERSER. SELECT REVERSE THRUST AND AUDIBLY CHECK OPERATION OF SELECTOR VALVE SOLENOID SOLENOID CHECK OK?
NO
4 DISCONNECT PLUG FROM SOLENOID AND TEMPORARILY CONNECT TO KNOWN SERVICEABLE SELECTOR VALVE. AUDIBLY CHECK OPERATION OF SOLENOID SOLENOID CHECK OK?
YES
5 CHANGE ORIGINAL SELECTOR VALVE FOR SERVICEABLE UNIT (78-31-01 R/I)
YES
NO
END OF PROBABLE CAUSES
6 CHECK WIRING BETWEEN VALVE AND PLUG C1 9811-P707 AT ENGINE/ AIRFRAME INTERFACE AND RECTIFY AS NECESSARY. RECONNECT PLUG TO ORIGINAL SELECTOR VALVE
TO 78-30-00 FIG.110 SHEET 2
45619

Thrust reverser does not operate from forward to reverse thrust - REVERSER OPERATING light ON - other light OFF
Fig.110, Sheet 1 of 2


FROM SHEET 1
7 FUNCTIONALLY TEST LOCK SEQUENCING VALVE AND R.H. LOCK MECHANISM (78-30-00 A/T) DOES LOCK AND MECHANISM TEST OK?
NO
8 RECTIFY AS NECESSARY
YES
9 CHECK SELECTOR VALVE CONTROL LINKAGE FOR DAMAGE AND SETTING (76-11-00 A/T) DOES LINKAGE AND SETTING CHECK OK?
NO
10 ADJUST (76-11-00) OR RECTIFY AS NECESSARY
YES
11 CHANGE SELECTOR VALVE (78-31-01 R/I)

45620

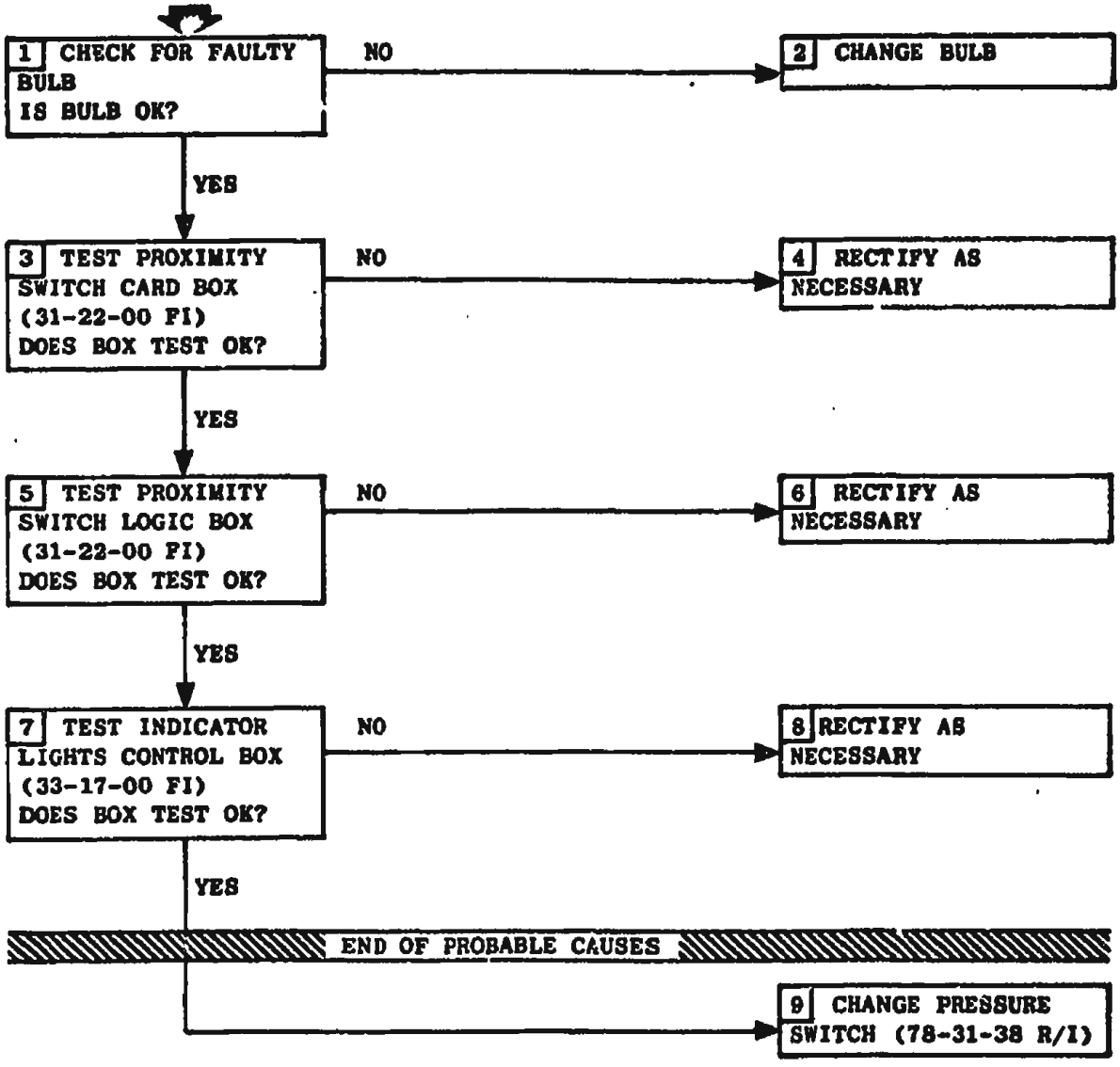
Thrust reverser does not operate from forward to reverse thrust - REVERSER OPERATING light ON - other light OFF
Fig.110, Sheet 2 of 2


UNABLE TO ACHIEVE REVERSE THRUST - ALL LIGHTS OFF
PREREQUISITES: ELECTRICAL POWER (MM 24-00-00)
1 CHECK THRUST REVERSER CIRCUIT BREAKERS ARE NOT TRIPPED
DO CIRCUIT BREAKERS TRIP WHEN REVERSER SELECTED?
YES
2 CHECK FOR SHORT CIRCUIT IN PRESSURE REGULATING AND SHUT-OFF VALVE, SELECTOR VALVE SOLENOIDS AND ASSOCIATED WIRING RECTIFY AS NECESSARY
NO
3 ENERGIZE ELECTRICAL SUPPLY TO THRUST REVERSER SELECT REVERSE THRUST AND AUDIBLY CHECK OPERATION OF PRESSURE REGULATING AND SHUT-OFF VALVE SOLENOID
DOES SOLENOID CHECK OK?
YES
4 CHANGE PRESSURE REGULATING AND SHUT-OFF VALVE (MM 78-31-02)
IF FAULT PERSISTS CHANGE PRESSURE REGULATING AND SHUT-OFF VALVE
REMOVE DE-ACTIVATION VALVE (MM 78-31-44)
NO
5 CHECK FOR 28V DC SUPPLY AT VALVE PLUG 7831-P073 PINS 1 AND 2
IS SUPPLY AVAILABLE?
YES
6 CHANGE PRESSURE REGULATING AND SHUT-OFF VALVE (MM 78-31-02)
NO
7 RECTIFY ELECTRICAL POWER SUPPLY FAULT
CAUTION: ENSURE ELECTRICAL CONNECTOR IS FREE FROM LIQUID AND/OR SOLID CONTAMINATION BEFORE DISCONNECTING AND CONNECTING
45621A

Unable to achieve reverse thrust - all lights OFF
Fig.111

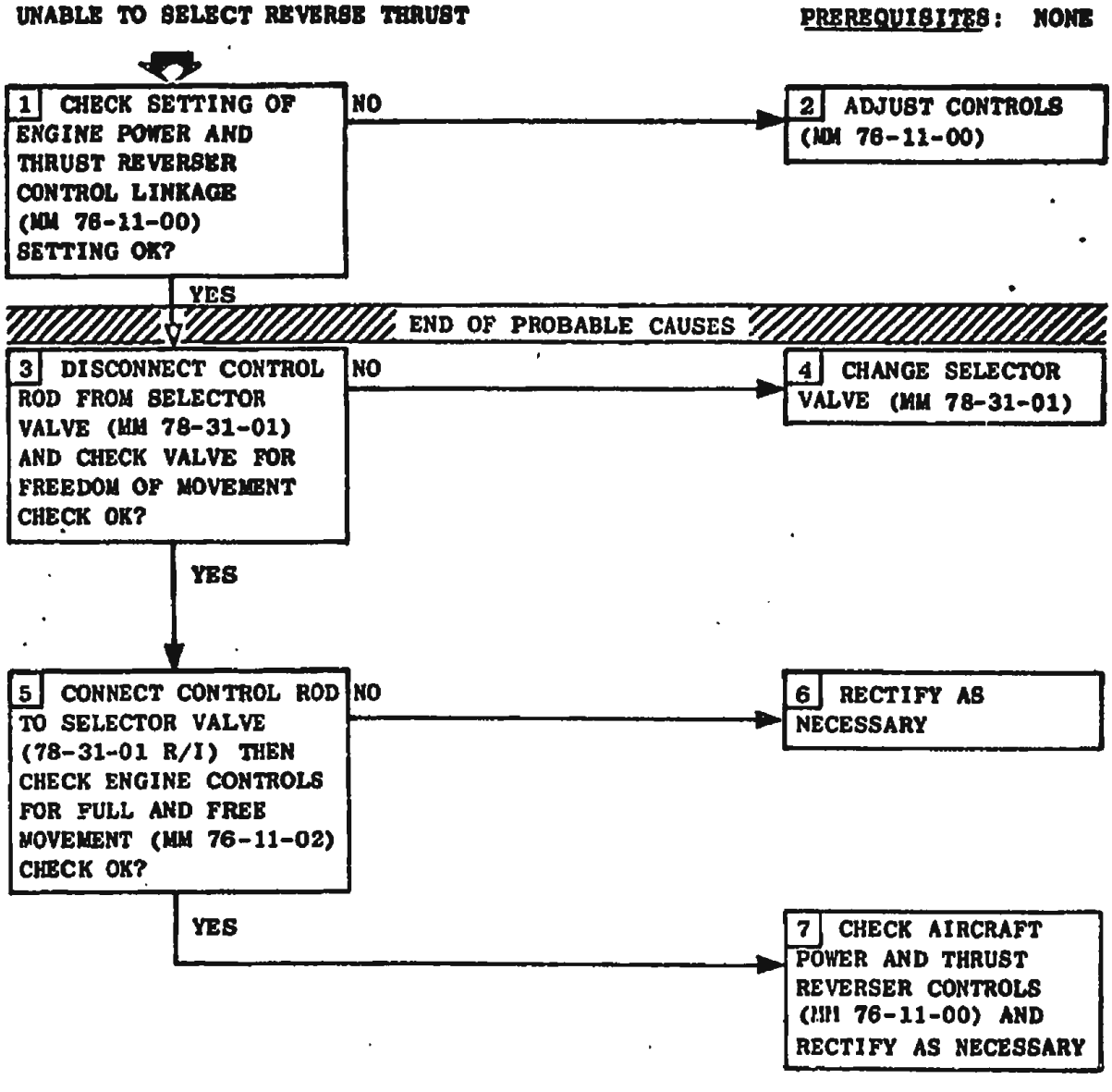
THRUST REVERSER PRESSURE INDICATING LIGHT EXTINGUISHED DURING REVERSER OPERATION

PREREQUISITES:
ELECTRICAL POWER (24-00-00)

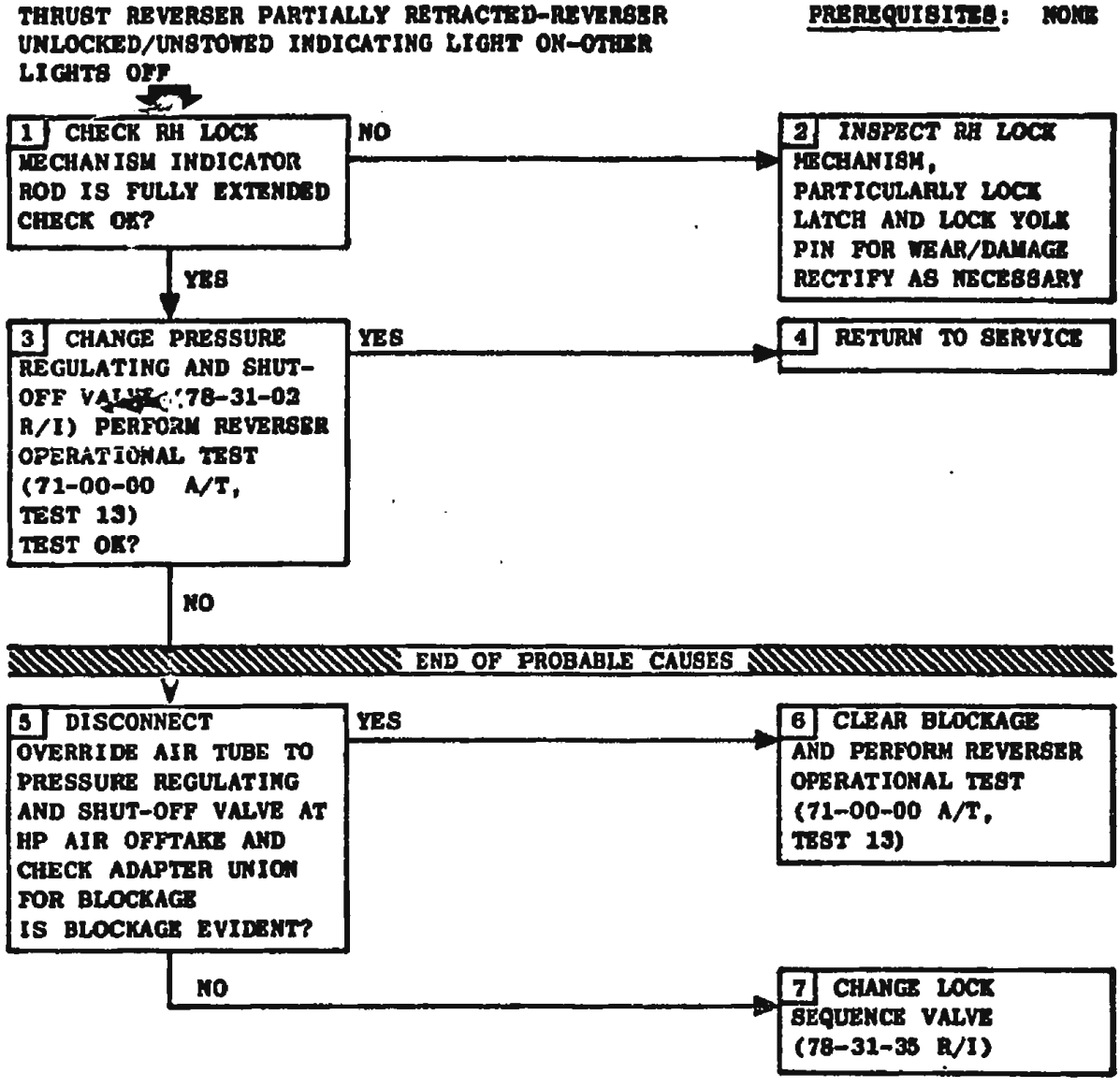


45622

REVERSER OPERATING light OFF during thrust reverser operation
Fig.112

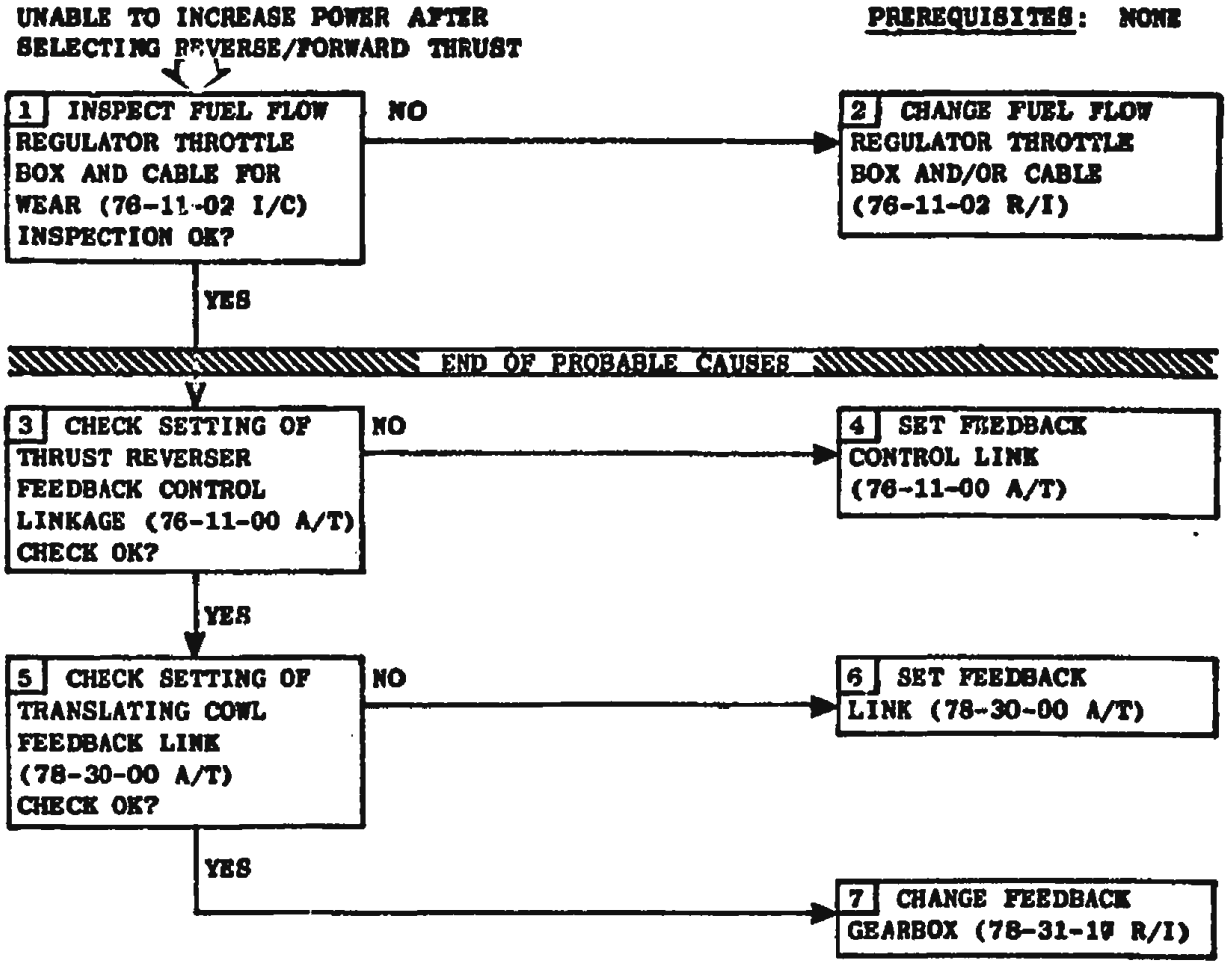

UNABLE TO SELECT REVERSE THRUST
PREREQUISITES: NONE
1 CHECK SETTING OF ENGINE POWER AND THRUST REVERSER CONTROL LINKAGE (MM 76-11-00) SETTING OK?
NO
2 ADJUST CONTROLS (MM 76-11-00)
YES
END OF PROBABLE CAUSES
3 DISCONNECT CONTROL ROD FROM SELECTOR VALVE (MM 78-31-01) AND CHECK VALVE FOR FREEDOM OF MOVEMENT CHECK OK?
NO
4 CHANGE SELECTOR VALVE (MM 78-31-01)
YES
5 CONNECT CONTROL ROD TO SELECTOR VALVE (78-31-01 R/I) THEN CHECK ENGINE CONTROLS FOR FULL AND FREE MOVEMENT (MM 76-11-02) CHECK OK?
NO
6 RECTIFY AS NECESSARY
YES
7 CHECK AIRCRAFT POWER AND THRUST REVERSER CONTROLS (MM 76-11-00) AND RECTIFY AS NECESSARY
45623A

Unable to select reverse thrust
Fig.113


THRUST REVERSER PARTIALLY RETRACTED-REVERSER UNLOCKED/UNSTOWED INDICATING LIGHT ON-OTHER LIGHTS OFF
PREREQUISITES: NONE
1 CHECK RH LOCK MECHANISM INDICATOR ROD IS FULLY EXTENDED CHECK OK?
NO
2 INSPECT RH LOCK MECHANISM, PARTICULARLY LOCK LATCH AND LOCK YOLK PIN FOR WEAR/DAMAGE RECTIFY AS NECESSARY
YES
3 CHANGE PRESSURE REGULATING AND SHUT-OFF VALVE (78-31-02 R/I) PERFORM REVERSER OPERATIONAL TEST (71-00-00 A/T, TEST 13) TEST OK?
YES
4 RETURN TO SERVICE
NO
END OF PROBABLE CAUSES
5 DISCONNECT OVERRIDE AIR TUBE TO PRESSURE REGULATING AND SHUT-OFF VALVE AT HP AIR OFFTAKE AND CHECK ADAPTER UNION FOR BLOCKAGE IS BLOCKAGE EVIDENT?
YES
6 CLEAR BLOCKAGE AND PERFORM REVERSER OPERATIONAL TEST (71-00-00 A/T, TEST 13)
NO
7 CHANGE LOCK SEQUENCE VALVE (78-31-35 R/I)

50053

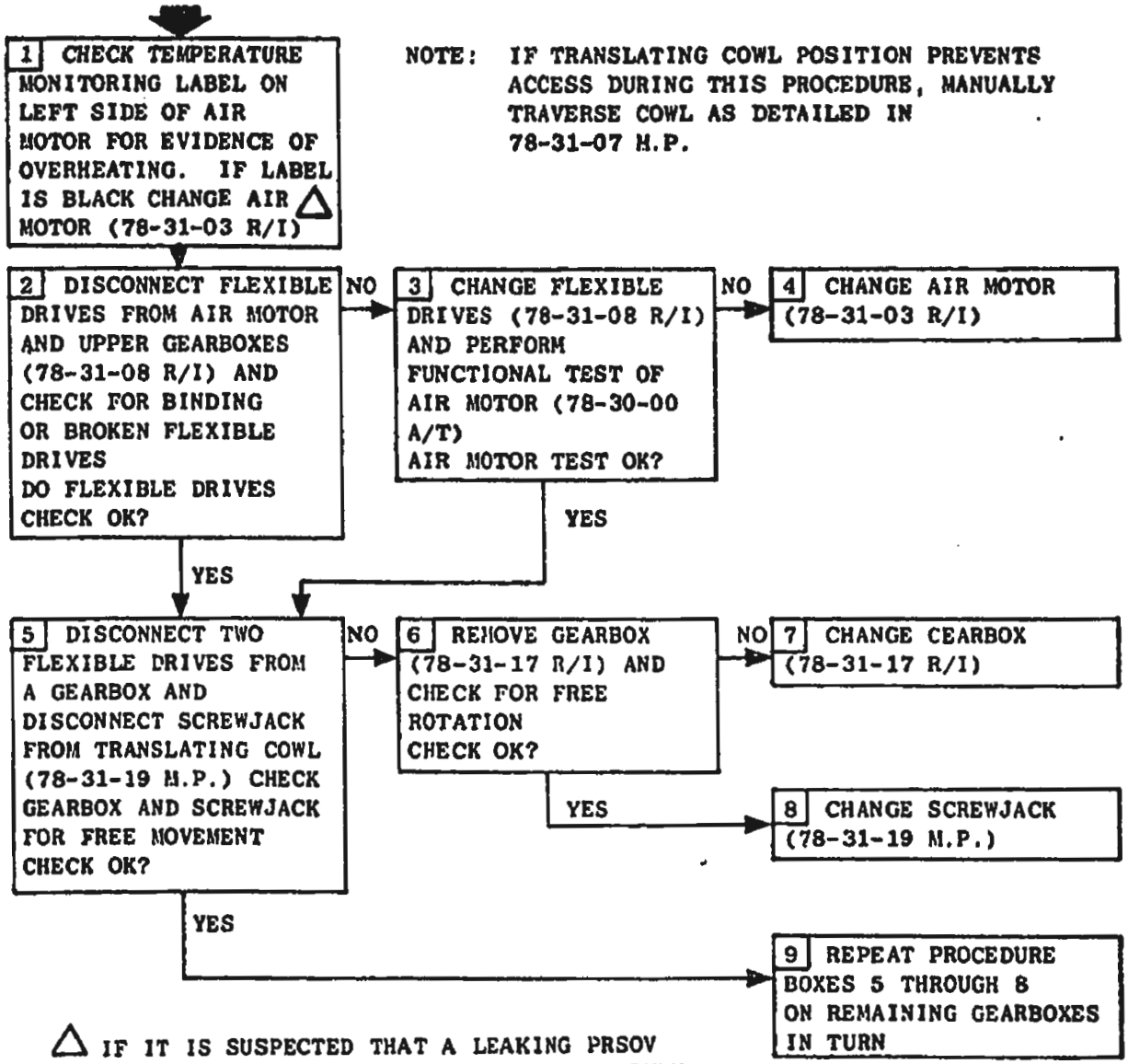
C REVERSER IN TRANSIT light ON, REVERSER OPERATING
C light OFF - Thrust reverser partially retracted
C Fig.114


UNABLE TO INCREASE POWER AFTER SELECTING REVERSE/FORWARD THRUST
PREREQUISITES: NONE
1 INSPECT FUEL FLOW REGULATOR THROTTLE BOX AND CABLE FOR WEAR (76-11-02 I/C) INSPECTION OK?
NO
2 CHANGE FUEL FLOW REGULATOR THROTTLE BOX AND/OR CABLE (76-11-02 R/I)
YES
END OF PROBABLE CAUSES
3 CHECK SETTING OF THRUST REVERSER FEEDBACK CONTROL LINKAGE (76-11-00 A/T) CHECK OK?
NO
4 SET FEEDBACK CONTROL LINK (76-11-00 A/T)
YES
5 CHECK SETTING OF TRANSLATING COWL FEEDBACK LINK (78-30-00 A/T) CHECK OK?
NO
6 SET FEEDBACK LINK (78-30-00 A/T)
YES
7 CHANGE FEEDBACK GEARBOX (78-31-10 R/I)
45628

Unable to increase power after selecting reverse thrust/ forward thrust
Fig.115

THRUST REVERSER CANNOT BE MANUALLY CYCLED

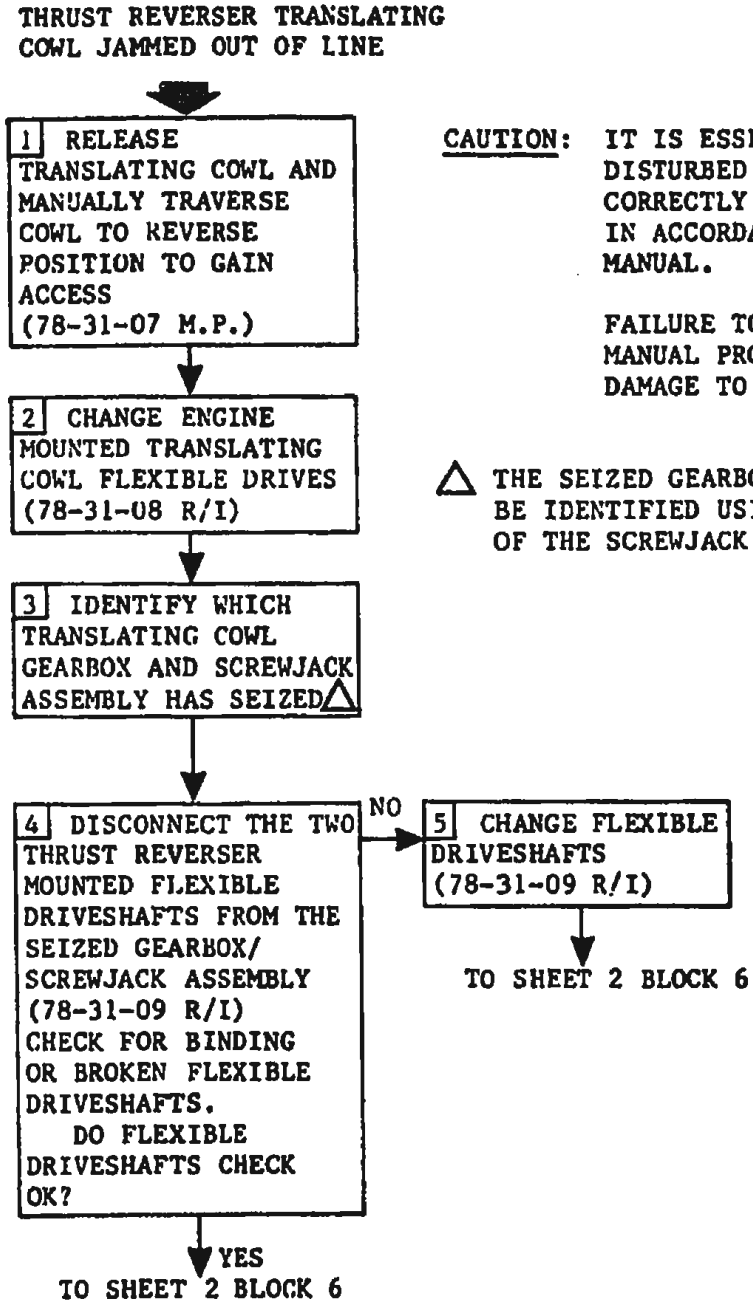
PREREQUISITES: NONE


1 CHECK TEMPERATURE MONITORING LABEL ON LEFT SIDE OF AIR MOTOR FOR EVIDENCE OF OVERHEATING. IF LABEL IS BLACK CHANGE AIR MOTOR (78-31-03 R/I) △
NOTE: IF TRANSLATING COWL POSITION PREVENTS ACCESS DURING THIS PROCEDURE, MANUALLY TRAVERSE COWL AS DETAILED IN 78-31-07 M.P.
2 DISCONNECT FLEXIBLE DRIVES FROM AIR MOTOR AND UPPER GEARBOXES (78-31-08 R/I) AND CHECK FOR BINDING OR BROKEN FLEXIBLE DRIVES
DO FLEXIBLE DRIVES CHECK OK?
NO
3 CHANGE FLEXIBLE DRIVES (78-31-08 R/I) AND PERFORM FUNCTIONAL TEST OF AIR MOTOR (78-30-00 A/T)
AIR MOTOR TEST OK?
NO
4 CHANGE AIR MOTOR (78-31-03 R/I)
YES
YES
5 DISCONNECT TWO FLEXIBLE DRIVES FROM A GEARBOX AND DISCONNECT SCREWJACK FROM TRANSLATING COWL (78-31-19 M.P.) CHECK GEARBOX AND SCREWJACK FOR FREE MOVEMENT
CHECK OK?
NO
6 REMOVE GEARBOX (78-31-17 R/I) AND CHECK FOR FREE ROTATION
CHECK OK?
NO
7 CHANGE GEARBOX (78-31-17 R/I)
YES
8 CHANGE SCREWJACK (78-31-19 M.P.)
YES
9 REPEAT PROCEDURE BOXES 5 THROUGH 8 ON REMAINING GEARBOXES IN TURN

△ IF IT IS SUSPECTED THAT A LEAKING PRSOV HAS CAUSED THE AIRMOTOR TO OVERHEAT, THEN THE PRSOV SHOULD BE CHANGED AT THE SAME TIME AS THE AIRMOTOR

45626B

Thrust reverser cannot be manually cycled
Fig.116


THRUST REVERSER TRANSLATING COWL JAMMED OUT OF LINE
1 RELEASE TRANSLATING COWL AND MANUALLY TRAVERSE COWL TO REVERSE POSITION TO GAIN ACCESS (78-31-07 M.P.)
2 CHANGE ENGINE MOUNTED TRANSLATING COWL FLEXIBLE DRIVES (78-31-08 R/I)
3 IDENTIFY WHICH TRANSLATING COWL GEARBOX AND SCREWJACK ASSEMBLY HAS SEIZED△
4 DISCONNECT THE TWO THRUST REVERSER MOUNTED FLEXIBLE DRIVESHAFTS FROM THE SEIZED GEARBOX/ SCREWJACK ASSEMBLY (78-31-09 R/I) CHECK FOR BINDING OR BROKEN FLEXIBLE DRIVESHAFTS.
DO FLEXIBLE DRIVESHAFTS CHECK OK?
NO
5 CHANGE FLEXIBLE DRIVESHAFTS (78-31-09 R/I)
TO SHEET 2 BLOCK 6
YES
TO SHEET 2 BLOCK 6

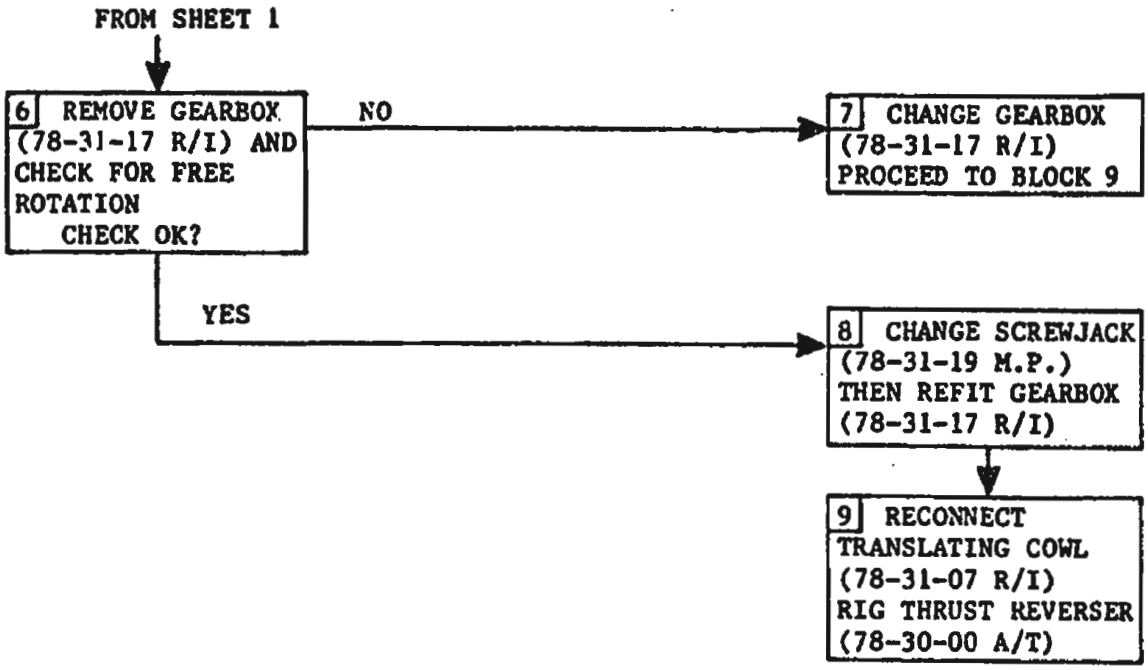
CAUTION: IT IS ESSENTIAL THAT ANY PARTS DISTURBED DURING THIS PROCEDURE ARE CORRECTLY INSTALLED AND RECONNECTED IN ACCORDANCE WITH THE MAINTENANCE MANUAL.

FAILURE TO OBSERVE MAINTENANCE MANUAL PROCEDURE MAY RESULT IN DAMAGE TO THE THRUST REVERSER.

△ THE SEIZED GEARBOX/SCREWJACK ASSEMBLY MAY BE IDENTIFIED USING A SPANNER ON THE FLATS OF THE SCREWJACK AND CHECKING FOR MOVEMENT.

A2027

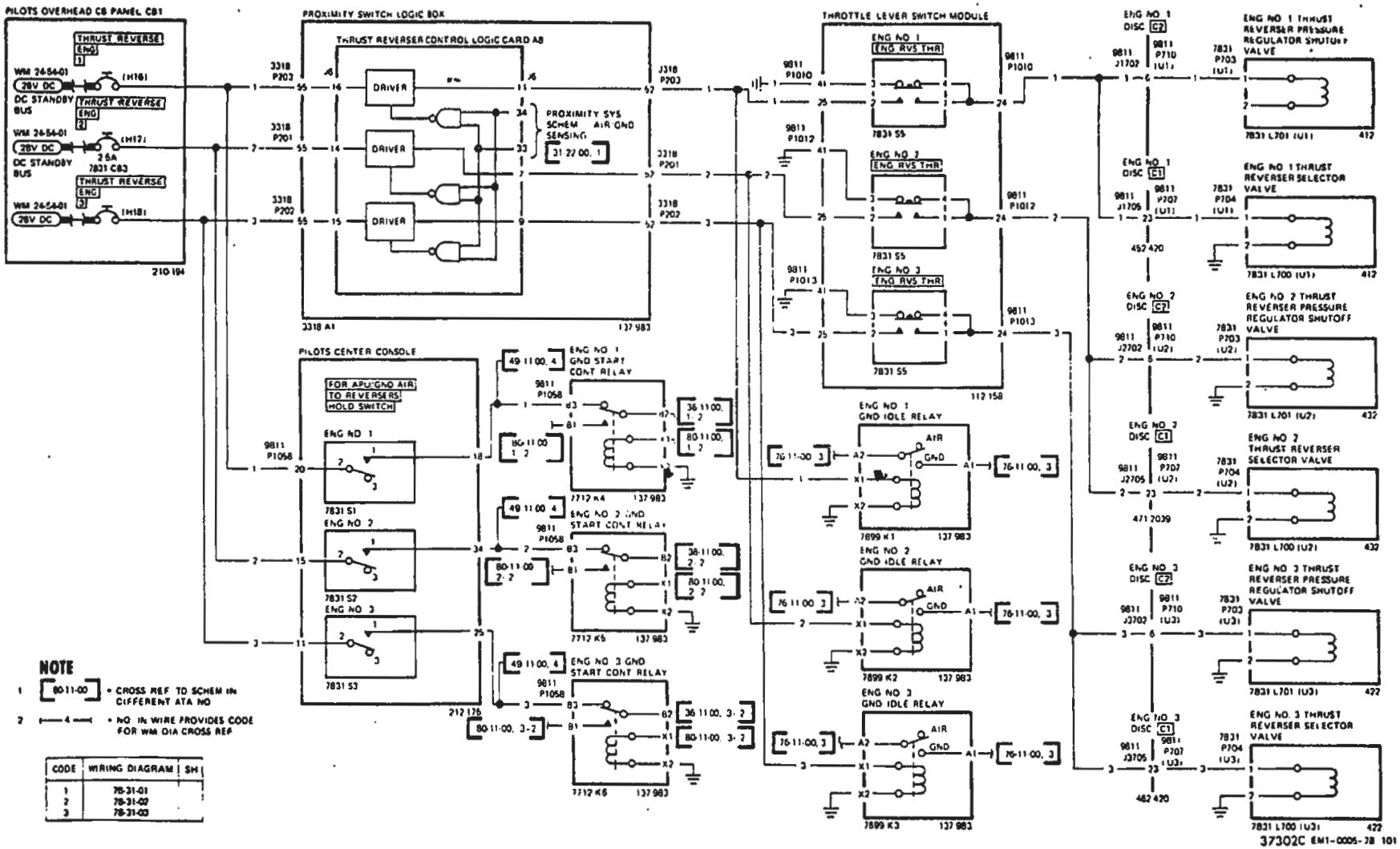
R Thrust Reverser Translating Cowl Jammed Out of Line
R Fig.117 (Sheet 1)


FROM SHEET 1
6 REMOVE GEARBOX (78-31-17 R/I) AND CHECK FOR FREE ROTATION
CHECK OK?
NO
7 CHANGE GEARBOX (78-31-17 R/I) PROCEED TO BLOCK 9
YES
8 CHANGE SCREWJACK (78-31-19 M.P.) THEN REFIT GEARBOX (78-31-17 R/I)
9 RECONNECT TRANSLATING COWL (78-31-07 R/I) RIG THRUST REVERSER (78-30-00 A/T)

A2028

R Thrust Reverser Translating Cowl Jammed Out of Line
R Fig.117 (Sheet 2)

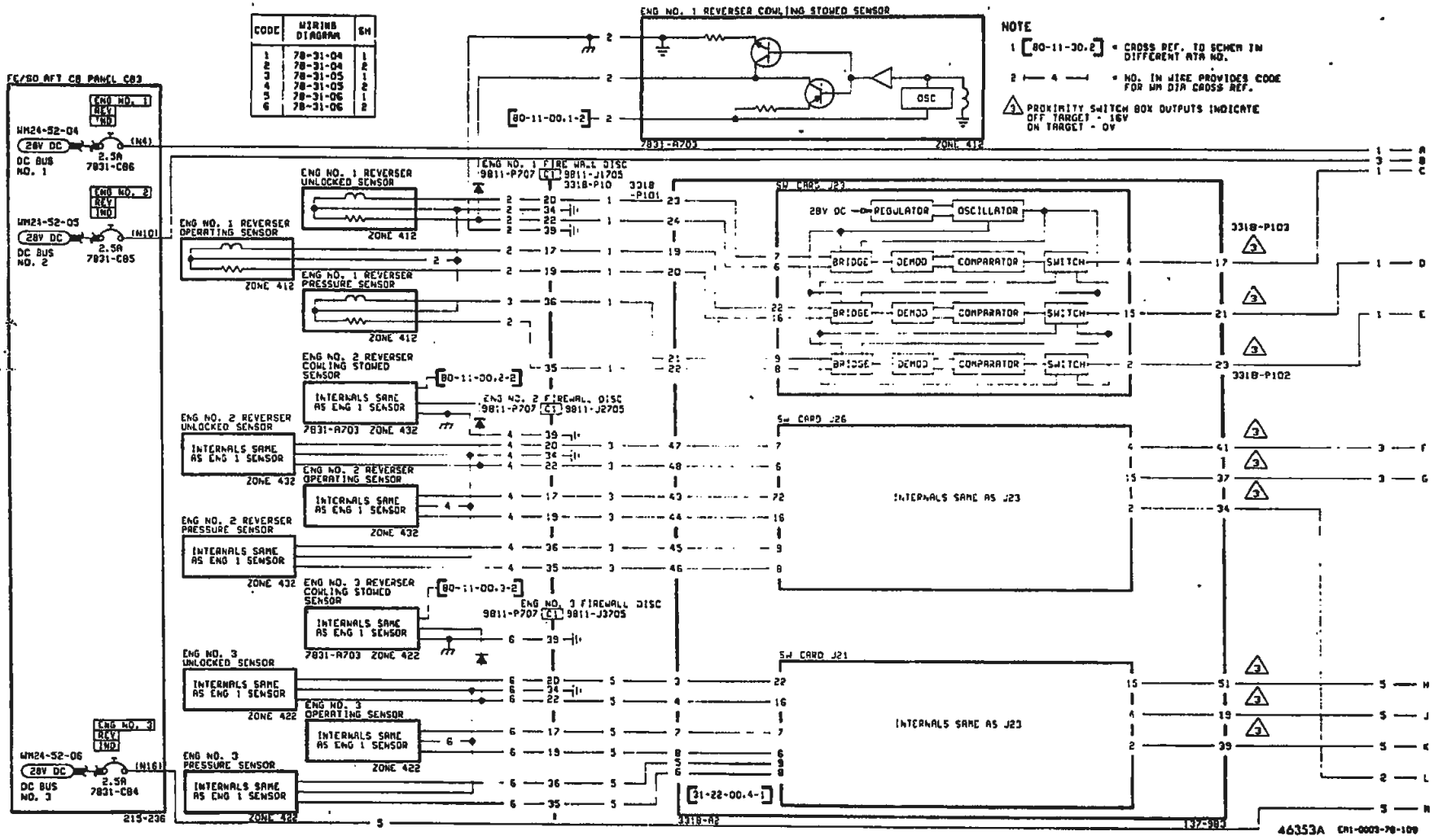
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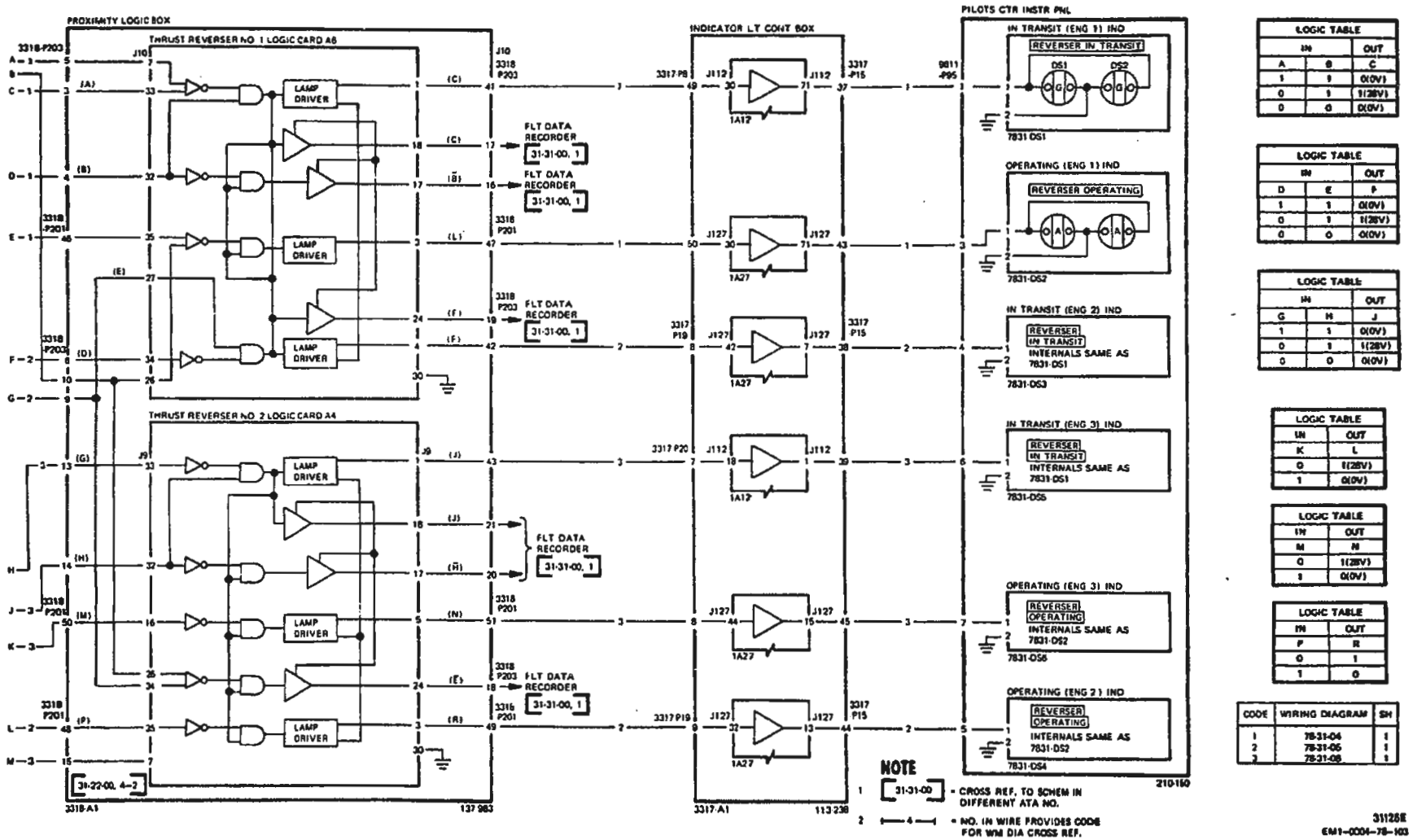
Thrust Reverser Control System Schematic
SCHEM 1

R EFFECTIVITY: ALL
R
050B

5G



Thrust Reverser Indication System Schematic
SCHEM 2, Sheet 1 of 2



LOGIC TABLE		
IN		OUT
A	B	C
1	1	0(0V)
0	1	1(28V)
0	0	0(0V)

LOGIC TABLE		
IN		OUT
D	E	F
1	1	0(0V)
0	1	1(28V)
0	0	0(0V)

LOGIC TABLE		
IN		OUT
G	H	J
1	1	0(0V)
0	1	1(28V)
0	0	0(0V)

LOGIC TABLE	
IN	OUT
K	L
0	1(28V)
1	0(0V)

LOGIC TABLE	
IN	OUT
M	N
0	1(28V)
1	0(0V)

LOGIC TABLE	
IN	OUT
P	R
0	1
1	0

CODE	WIRING DIAGRAM	SH
1	78-31-04	1
2	78-31-05	1
3	78-31-06	1

311258
EM1-0004-78-103

Thrust Reverser Indication System Schematic
SCHEM 2, Sheet 2 of 2

R EFFECTIVITY: ALL
R
050B

5G

THRUST REVERSER - SERVICING

1. Lock Thrust Reverser System

Service Bulletins referred to:

S.B.71-2282 - R.H. hinged cowl, introduction of hole in rear edge of cowl.
S.B.71-3414 - Inverted High Pressure Valve Deactivation Valve

A. Lock System in Forward Thrust

(1) Equipment required:

UT.921/2 Collar
3502495 Key pin (S.B.71-3414)

(2) Ensure thrust reverser system is in forward thrust position with throttle and reverse thrust levers in forward idle position.

(3) Tag throttle levers, reverse thrust levers and APU/GND AIR REVERSER switches.

(4) Open and tag appropriate THRUST REVERSE circuit breaker (H16, H17 or H18) on pilot's overhead circuit breaker panel CB1, zone 210.

(5) Open and tag appropriate START AIR VALVE circuit breaker (N3, N9 or N15) on flight engineer/second officers aft circuit breaker panel CB3, zone 215.

(6) Tag appropriate ENGINE START panel switchlights.

(7) On engines incorporating S.B.71-3414 and S.B.71-2282 proceed as follows:

(a) Refer to fig.301, insert key pin through R.H. cowl and into deactivating valve to isolate reverser from air supply. Ensure key pin is firmly in position and warning pennant is clearly visible.

(b) With ground service system energized (Ref. 24-41-00), ensure HI PRESS switch is off (switchlight latched out) and flow bar light is out indicating H.P. shut-off valve is closed.

(c) De-energize ground service system (Ref. 24-41-00).

(8) On engines not incorporating S.B.71-3414 proceed as follows:

(a) Remove access panel 511LB-3 or 611LB-3 for engine No.1 or No.3, or 471AL for engine No.2.

(b) Manually lock engine isolation valve in closed position (Ref. 36-11-00).

(c) With ground service system energized (Ref. 24-41-00), ensure HI PRESS switch is off (switchlight latched out) and flow bar light is out indicating H.P. shut-off valve is closed.

(d) De-energize ground service system (Ref. 24-41-00).

(e) Open L.H. hinged cowl, 413A/423A for engine No.1 or No.3 (Ref. 71-11-00, Servicing) or 433DL for engine No.2 (Ref. 71-12-05, Servicing).

(f) Refer to fig.302 (Sheet 1) ensure selector valve actuator rod is fully extended (forward thrust position); position lock collar over actuator rod. Ensure warning pennant is clearly visible.

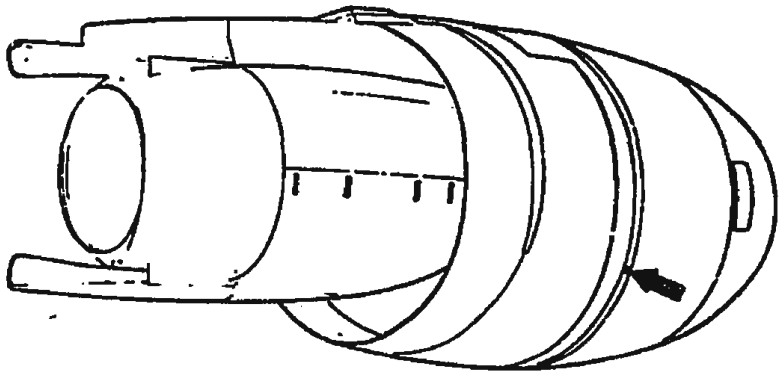
B. Unlock System in Forward Thrust

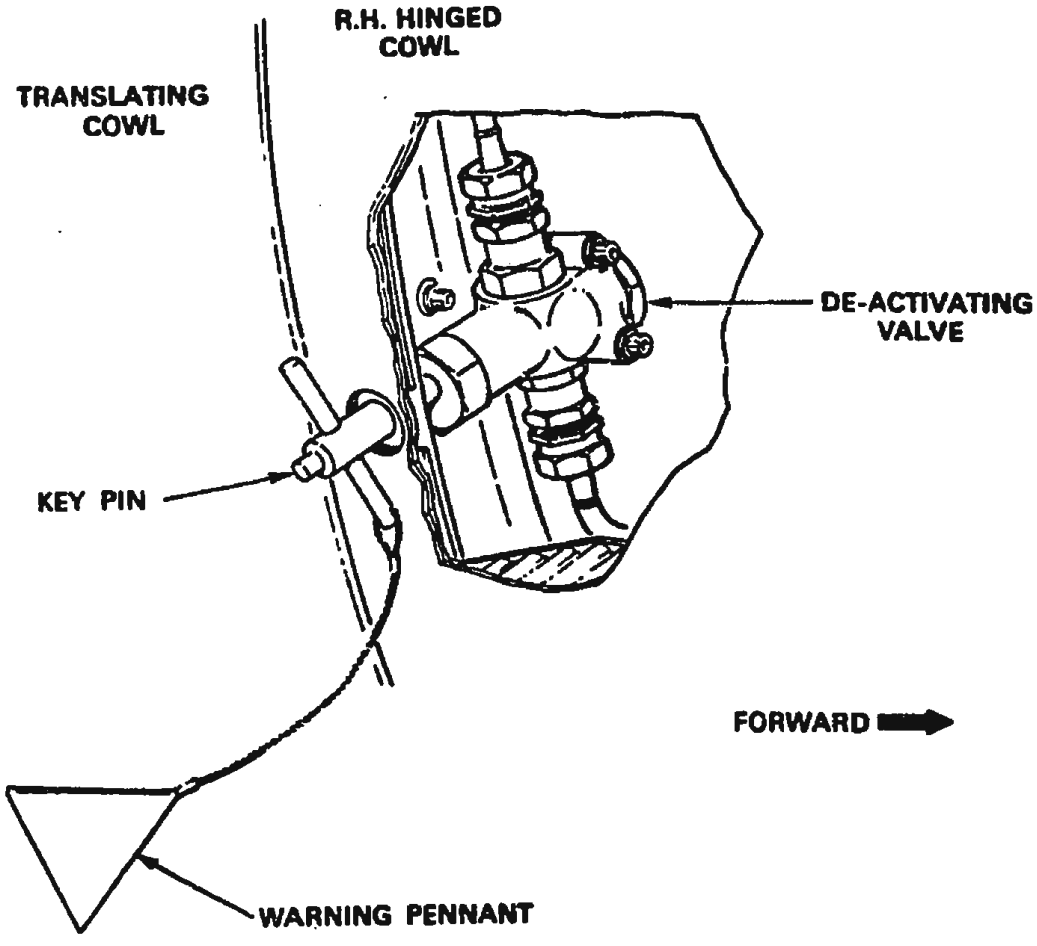
(1) Ensure circuit breakers are open and systems tagged as detailed in operations A. (3) through (6).

(2) On engines incorporating S.B.71-3414, refer to fig.301, depress centre button on key pin and remove pin.

(3) On engines not incorporating S.B.71-3414:

(a) Refer to fig.302 (sheet 1), remove lock collar from actuator rod.





Thrust reverser system deactivation
Fig.301

(b) Close L.H. hinged cowl, 413A/423A for engine No.1 or No.3 (Ref. 71-11-00, Servicing) or 433DL for engine No.2 (Ref. 71-12-05, Servicing).

(c) Unlock engine isolation valve (Ref. 36-11-00).

(d) Fit access panel 511LB-3 or 611LB-3 for engine No.1 or No.3, or 471AL for engine No.2.

(4) Ensure H.P. shut-off valve selected open (switchlight latched in).

(5) Remove tags and close circuit breakers opened in operations A. (3) through (6).

C. Lock System in Reverse Thrust

(1) Equipment required:

UT.920/2	Clamp
UT.1031/1	(RR) or BC68-101 (LCC) Blocker (2 off)
3502495	Key pin (S.B.71-3414)
UT.1090	Dirt excluder, translating cowl screwjack (set of 4)

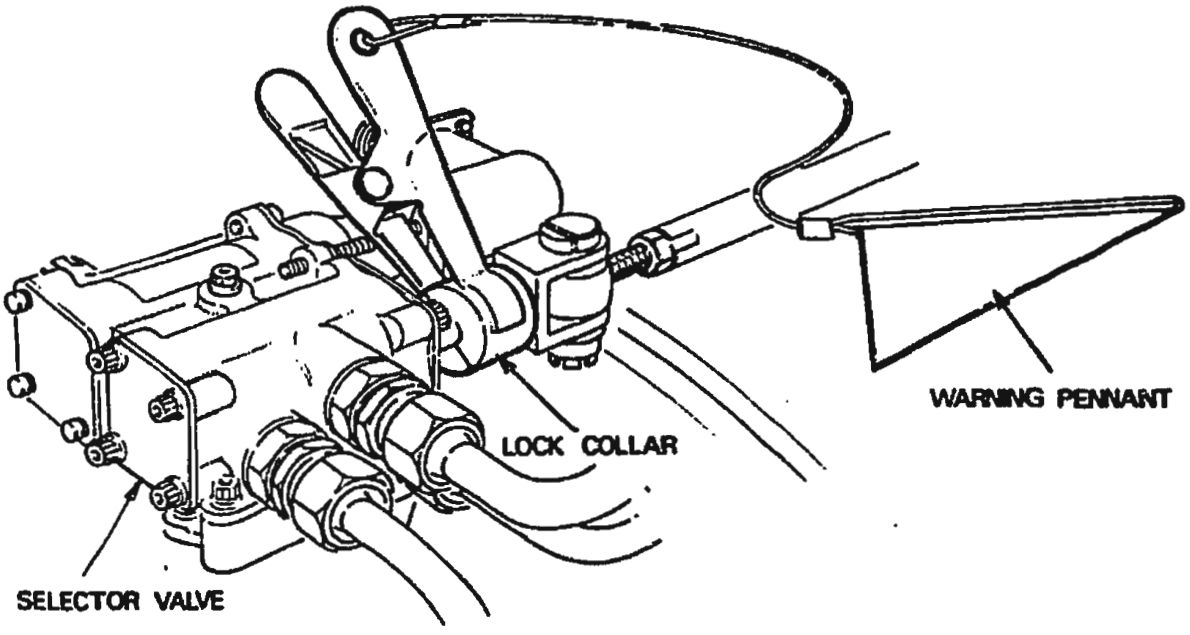
(2) Operate thrust reverser system to reverse thrust position (Ref. 78-30-00, Adjustment/Test).

(3) Tag reverse thrust lever and APU/GND AIR REVERSER switches.

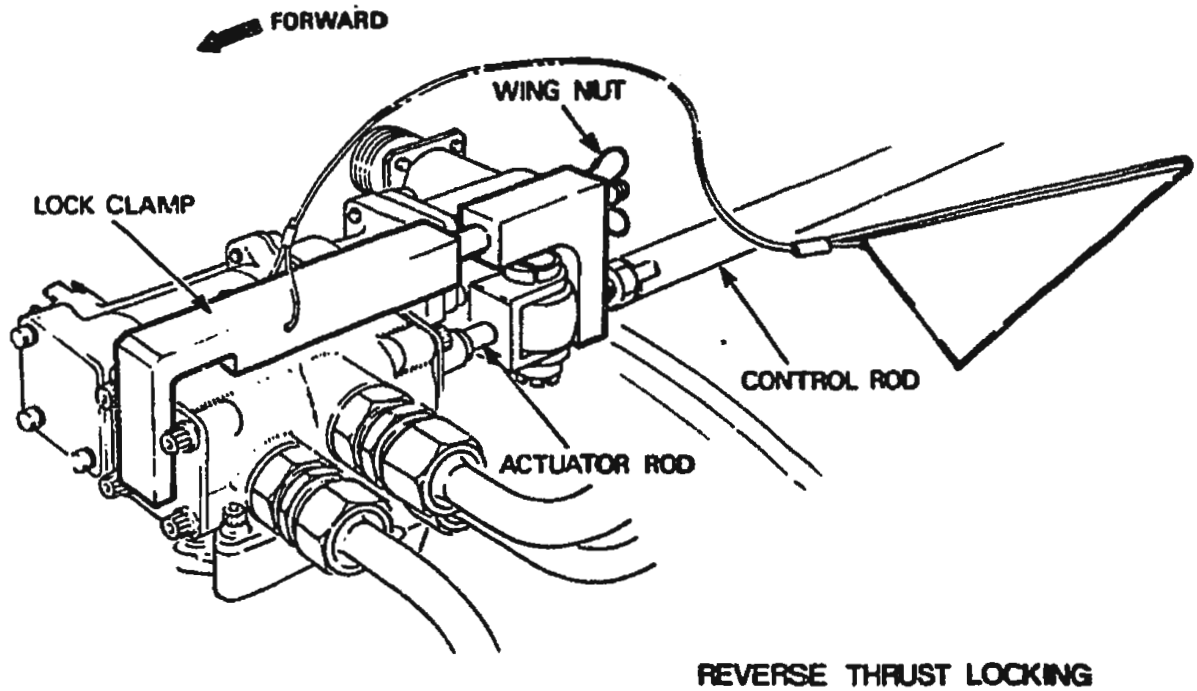
(4) Open and tag appropriate THRUST REVERSE circuit breaker (H16, H17 or H18) on pilot's overheat circuit breaker panel CB1 zone 210.

(5) Open and tag appropriate START AIR VALVE circuit breaker (N3,N9 or N15) on flight engineer/second officer's aft circuit breaker panel CB3, zone 215.

(6) Tag appropriate ENGINE START panel switchlights.



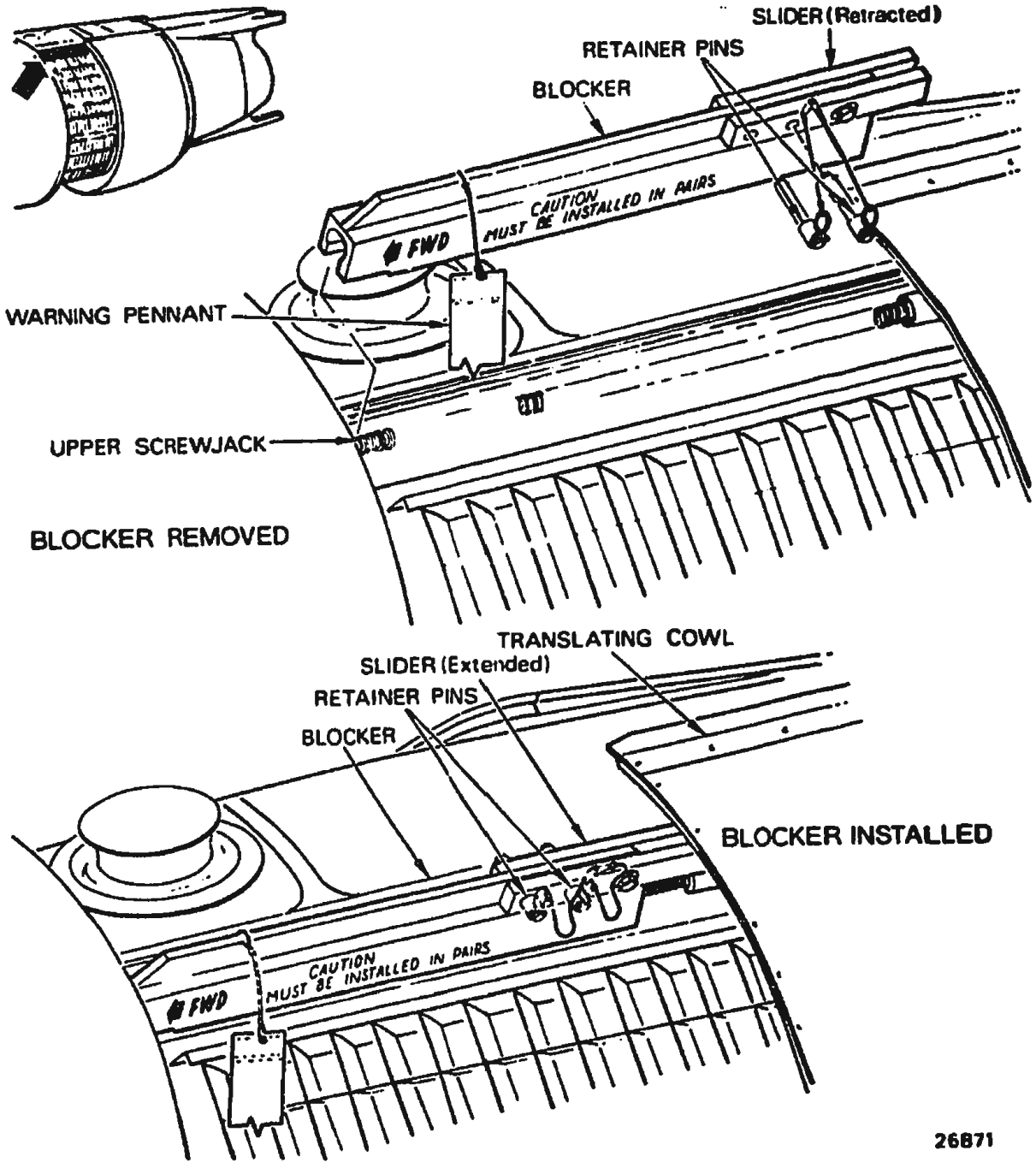
FORWARD THRUST LOCKING



REVERSE THRUST LOCKING

24107A

Thrust reverser ground locks
Fig.302 (Sheet 1)



Thrust reverser ground locks
Fig.302 (Sheet 2)

(7) On engines incorporating S.B.71-3414 and S.B.71-2282 proceed as follows:

(a) Refer to fig.301, insert key pin through R.H. cowl and into deactivating valve to isolate reverser from air supply. Ensure key pin is firmly in position and warning pennant is clearly visible.

(b) With ground service system energized (Ref. 24-41-00), ensure HI PRESS switch is off (switchlight latched out) and flow bar light is out indicating H.P. shut-off valve is closed.

(c) De-energize ground service system (Ref. 24-41-00).

(8) On engines not incorporating S.B.71-3414 proceed as follows:

(a) Remove access panel 511LB-3 or 611LB-3 for engine No.1 or No.3, or 471AL for engine No.2.

(b) Manually lock engine isolation valve in closed position (Ref. 36-11-00).

(c) With ground service system energized (Ref. 24-41-00), ensure HI PRESS switch is off (switchlight latched out) and flow bar light is out indicating H.P. shut-off valve is closed.

(d) De-energize ground service system (Ref. 24-41-00).

(e) Open L.H. hinged cowl, 413A/423A for engine No.1 or No.3 (Ref. 71-11-00, Servicing) or 433DL for engine No.2 (Ref. 71-12-05, Servicing).

(f) Refer to fig.302 (Sheet 1), ensure selector valve actuator rod is fully retracted (reverse thrust position). Position lock clamp over selector valve, screw wing nut clockwise to secure clamp in position and prevent movement of actuator rod. Ensure warning pennant is clearly visible.

(9) Refer to fig.302 (sheet 2) remove retainer pins from blocker. Retract slider and position blocker over left-hand upper screwjack, ensuring directional arrow points forward.

(10) Slide blocker forward to abut gearbox, extend slider rearward until pin holes align and fit both retainer pins. Ensure warning pennant is clearly visible.

(11) Repeat operations (9) and (10) to fit blocker over right-hand upper screwjack.

(12) Fit dirt excluders to remaining screwjacks.

D. Unlock system in Reverse Thrust

(1) Ensure circuit breakers are open and systems tagged as detailed in operation C. (3) through (6).

(2) Remove dirt excluders.

(3) Refer to fig.302 (Sheet 2), withdraw retainer pins, retract sliders and remove blockers from both upper screwjacks.

(4) On engines incorporating S.B.71-3414, refer to fig.301, depress centre button on key pin and remove pin.

(5) On engines not incorporating S.B.71-3414:

(a) Refer to fig.302 (Sheet 1), slacken wing nut and remove lock clamp from selector valve.

(b) Close L.H. hinged cowl, 413A/423A for engine No.1 or No.3 (Ref. 71-11-00, Servicing) or 433DL for engine No.2 (Ref. 71-12-05, Servicing).

(c) Unlock engine isolation valve (Ref. 36-11-00).

(d) Fit access panel 511LB-3 or 611LB-3 for engine No.1 or No.3, or 471AL for engine No.2.

(6) Ensure H.P. shut-off valve selected open (switchlight latched in).

(7) Remove tags and close circuit breakers opened in operation C. (3) through (6).

(8) Operate system to forward thrust position (Ref. 78-30-00, Adjustment/Test).

THRUST REVERSER - ADJUSTMENT/TEST

The procedures described in this section are listed below:

Paragraph	Procedure
1.	Functional test thrust reverser system
A.	Functional test complete system
B.	Functional test air motor
C.	Functional test lock sequencing valve
D.	Functional test secondary lock ram
E.	Check air motor travel
2.	Set thrust reverser system
A.	Set thrust reverser selector valve control linkage
B.	Set translating cowl locking mechanism
C.	Set stowed sensor target (S.B.78-3753)
D.	Set air motor
E.	Set cold stream reverser
F.	Set thrust reverser feedback link
G	Set thrust reverser feedback control linkage
H.	Set secondary lock ram sensor (S.B.78-3769)
J.	Set extend proximity switch sensor target
3.	Manual cycle thrust reverser (Pre S.B.78-3608 and Pre AiResearch S.B.121186-78-1172)
4.	Manual cycle thrust reverser (S.B.78-3608 and AiResearch S.B.121186-78-1172)
R 5.	Replaced component rigging requirement chart

1. Functional Test Thrust Reverser System (A.P.U. or External Air Supply)

WARNING: OPERATION OF TRANSLATING COWL IS ACHIEVED IN APPROXIMATELY 2 SECONDS. ENSURE ALL PERSONNEL, EQUIPMENT, TOOLS AND LOOSE ARTICLES ARE CLEAR OF IMMEDIATE AREA BEFORE COMMENCING OPERATION.

Referenced Procedures:

24-41-00	External Power/Ground Service System - Maintenance Practices
70-51-00	Torque Tightening Technique
71-11-00	Cowling, Engines No.1 and No.3 - Servicing
71-12-05	L.H. and R.H. Upper Hinged Cowls - Servicing
72-03-00	Gas Generator Fairings - Removal/Installation
78-30-00	Thrust Reverser - Servicing

A. Functional Test Complete System

(1)	Engine throttle levers	- Ground idle and tagged
(2)	Appropriate START AIR VALVE circuit breaker (CB3)	- Open and tag
(3)	Appropriate ENGINE START panel switchlights	- Tag
(4)	Reverse thrust lever	- Forward thrust

(5)	External power system	-	Connect and energize (Ref. 24-41-00)
(6)	HI PRESS switchlight	-	Ensure selected open (switch-light latched in) for reverser being operated. Ensure selected closed (OFF legend illuminated) for reversers not being operated (Ref. 36-11-00).
(7)	ENG. ISLN VALVE switchlight	-	Ensure selected open (switch-light latched in) for reverser being operated. Ensure selected closed (OFF legend illuminated) for reversers not being operated (Ref. 36-11-00).
(8)	Duct ISLN VALVE and CROSS BLEED valves	-	Ensure all three selected open (switch-light latched in) (Ref.36-14-00).
(9)	PACK FLOW CONTROL switchlights	-	Ensure all three selected closed (Ref. 21-21-00).
(10)	A.P.U.	-	Start and operate or select to MAX. MODE
		or	
	External air supply	-	Connect with two hoses to high pressure ground connector (Ref. 36-13-00).
(11)	Air pressure	-	15 p.s.i.g. minimum during air motor maximum flow conditions. (Ensure a minimum static pressure on bleed air pressure gauge of 35 p.s.i.g. with external air supply, or 26 p.s.i.g. with A.P.U. prior to reverser operation).

(12) Selection of reverse thrust:

(a) APU/GND AIR TO REVERSER switch - Lift and hold for a minimum of 60 seconds before selecting reverse thrust, then hold until full reverse position is achieved.

(b) Reverse thrust lever - Reverse thrust

(c) REVERSER OPERATING light - On
REVERSER IN TRANSIT light - On

(d) When thrust reverser reaches full reverse position, check:

REVERSER IN TRANSIT light - Out
REVERSER OPERATING light - On

(e) APU/GND AIR TO REVERSER switch - Release

(f) REVERSER OPERATING light - Out

(13) External power system - De-energize (Ref.24-41-00)

(14) Translating cowl locking mechanism . - Refer to fig.501 and 502, ensure lock yokes (6) are held open by lock latches (5).

(15) Selection of forward thrust:

(a) External power system - Energize (Ref.24-41-00)

	(b)	APU/GND AIR TO REVERSER switch	- Lift and hold for a minimum of 60 seconds before selecting forward thrust, then hold until full forward position is achieved.
	(c)	REVERSER OPERATING light	- On
	(d)	Reverse thrust lever	- Forward thrust
	(e)	Check:	
		REVERSER IN TRANSIT light	- On
		REVERSER OPERATING light	- On
	(f)	When thrust reverser reaches full forward position, check:	
		REVERSER IN TRANSIT light	- Out
		REVERSER OPERATING light	- Out
	(g)	APU/GND AIR TO REVERSER switch	- Release
	(16)	A.P.U.	- Stop
			or
		External air supply	- Shut off and disconnect
	(17)	External power system	- De-energize (Ref.24-41-00)
R	(18)	Reverser lock indicating rods	- Check retracted (underflush)
	(19)	START AIR VALVE circuit breaker	- Remove tag and close
	(20)	ENGINE START panel switchlight	- Remove tag
	(21)	Engine throttle levers	- Remove tag

B. Functional Test Air Motor

(1) Equipment required:

UT.944/2 Translating cowl unlocking tool

(2)	Engine throttle levers	-	Ground idle and tagged
(3)	Appropriate START AIR VALVE circuit breaker (CB3)	-	Open and tag
(4)	Appropriate ENGINE START panel switchlights	-	Tag
(5)	Reverse thrust lever	-	Forward thrust

(6) Remove pylon fairing L.H. access panel 418DL, 428DC or 438DL (72-03-00).

(7) Refer to fig.503, disconnect flexible drives (1) and (2) from air motor.

(8)	External power system	-	Energize (Ref. 24-41-00)
(9)	HI PRESS switchlight	-	Ensure selected open (switch-light latched in) for reverser being operated. Ensure selected closed (OFF legend illuminated) for reversers not being operated (Ref. 36-11-00).
(10)	ENG. ISLN VALVE switchlight	-	Ensure selected open (switch-light latched in) for reverser being operated. Ensure selected closed (OFF legend illuminated) for reversers not being operated (Ref. 36-11-00).
(11)	Duct ISLN VALVE and CROSS BLEED valves	-	Ensure all three selected open (switch-light latched in) (Ref.36-14-00).

(12) PACK FLOW CONTROL switchlights - Ensure all three selected closed (Ref. 21-21-00).

(13) A.P.U. - Start and operate or select to MAX. MODE

or

External air supply - Connect with two hoses to high pressure ground connector (Ref. 36-13-00).

(14) Air pressure - 15 p.s.i.g. minimum during air motor maximum flow conditions. (Ensure a minimum static pressure on bleed air pressure gauge of 35 p.s.i.g. with external air supply, or 26 p.s.i.g. with A.P.U. prior to reverser operation).

(15) Selection of reverse thrust:

(a) APU/GND AIR TO REVERSER switch - Lift and hold for a minimum of 60 seconds before selecting reverse thrust, then hold until full reverse position is achieved.

(b) Select reverse thrust and check REVERSER OPERATING light on.

(c) When air motor operation is complete:

Release APU/GND AIR TO REVERSER switch and check REVERSER OPERATING light goes out.

(d) De-energize external power system (Ref.24-41-00).

(e) Refer to fig.504 (Sheet 1) check D.C.V. linkage is in extended position. Ref to fig.504 (Sheet 2) check position indicator window is blank and a yellow disc is visible in brake indicator window.

(16) Selection of forward thrust:

(a) Refer to fig.505, fit unlocking tool UT.944/2 to lock sequencing valve; pull down to release lock and fit collar.

(b) External power system - Energize (Ref.24-41-00)

(c) APU/GND AIR TO REVERSER switch - Lift and hold for a minimum of 60 seconds before selecting forward thrust, then hold until full forward position is achieved.

(d) Check REVERSER OPERATING light comes on.

(e) Select forward thrust.

(f) When air motor operation is complete:

Release APU/GND AIR TO REVERSER switch and check REVERSER OPERATING light goes out.

(g) Refer to fig.504 (Sheet 1), check D.C.V. linkage is in retracted position. Refer to fig.504 (Sheet 2), check yellow disc visible in position indicator window and brake indicator window.

(17) A.P.U. - Stop

or

External air supply - Shut off and disconnect

(18) External power system - De-energize (Ref.24-41-00)

(19) Remove lock sequencing valve unlocking tool.

R (20) Reverser lock indicating rod - Check retracted (Underflush)

(21) START AIR VALVE circuit breaker - Remove tag and close

(22) ENGINE START panel switchlight - Remove tag

(23) Engine throttle levers - Remove tag

CAUTION: THE THRUST REVERSER SYSTEM MUST BE SET BEFORE AIR MOTOR FLEXIBLE DRIVES ARE RE-CONNECTED.

If the foregoing procedure was implemented as a requirement of a trouble shooting procedure, fitting of the air motor flexible drives and air motor L.H. access panel will be accomplished during subsequent trouble shooting operations.

If, however, the foregoing procedure was implemented for any other reason. Then the thrust reverser system must be set as detailed in para.2.

C. Functional Test Lock Sequencing Valve

WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION (REF. 78-30-00, SERVICING) WHILE WORK IS IN PROGRESS.

(1) Equipment required:

MH12730 Pressure blank
MH12731 Adapter

(2) Operate thrust reverser system to reverse thrust position (Ref. para 1, 3 or 4, as applicable).

(3) Tag throttle levers, reverse thrust levers and APU/GND AIR TO REVERSER switches.

(4) Open and tag appropriate THRUST REVERSE circuit breaker on pilot's overhead circuit breaker panel CB1, zone 210.

(5) Open and tag appropriate START AIR VALVE circuit breaker on flight engineer/second officer's aft circuit breaker panel CB3, zone 215.

(6) Tag appropriate ENGINE START panel switchlights.

(7) Open R.H. hinged cowl 414A or 424A for engines No.1 and No.3 (Ref. 71-11-00), or R.H. upper hinged cowl 434DR for engine No.2 (Ref. 71-12-05).

(8) Refer to fig.502, lift lock latch (5) to release lock yoke (6).

(9) Disconnect connectors (7) and (8) from lock sequencing valve.

(10) Fit pressure blank to air outlet (10); fit adapter to air inlet (9).

(11) Connect air supply to adapter; apply 12 p.s.i. to operate lock sequencing valve and lock mechanism.

(12) Release pressure and disconnect air supply; check that lock yoke (6) is retained in open position by lock latch (5) and indicating rod protrudes approximately 0.75in. (19,05 mm.) through firewall.

(13) Remove blank from air outlet (10) and remove adapter from air inlet (9).

(14) Connect and secure (Ref. 70-51-00) connectors (7) and (8) and wirelock.

(15) Close cowls opened in operation (7).

(16) Remove tags and close circuit breakers opened in operations (3) through (6).

(17) CAUTION: IN OPERATION C.(2), IF THE THRUST REVERSER SYSTEM WAS PNEUMATICALLY OPERATED TO REVERSE THRUST POSITION. THEN THE THRUST REVERSER SYSTEM MUST BE PNEUMATICALLY OPERATED TO FORWARD THRUST POSITION.
Operate thrust reverser to forward thrust position (Ref. para.1, 3 or 4, as applicable).

D. Functional Test Secondary Lock Ram

WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION (REF. 78-30-00, SERVICING) WHILE WORK IS IN PROGRESS.

(1) Equipment required:

MH.12730 Pressure blank
MH.12731 Adapter

(2) Operate thrust reverser system to reverse thrust position (Ref. para. 1, 3 or 4, as applicable).

(3) Tag throttle levers, reverse thrust levers and APU/GND AIR TO REVERSER switches.

(4) Open and tag appropriate THRUST REVERSE circuit breaker on pilot's overhead circuit breaker panel CB1, zone 210.

(5) Open and tag appropriate START AIR VALVE circuit breaker on flight engineer/second officer's aft circuit breaker panel CB3, zone 215.

(6) Tag appropriate ENGINE START panel switchlights.

(7) Open L.H. hinged cowl 413A or 423A for engines No.1 or No.3 (Ref. 71-11-00), or L.H. upper hinged cowl 433DL for engine No.2 (Ref. 71-12-05).

(8) Refer to fig.501, lift lock latch (5) to release lock yoke (6).

(9) Disconnect connectors (7) and (8) from secondary lock ram.

(10) Fit pressure blank to air outlet (10); fit adapter to air inlet (9).

(11) Connect air supply to adapter, apply 12 p.s.i. to operate secondary lock ram and lock mechanism.

(12) Release pressure and disconnect air supply; check that lock yoke (6) is retained in open position by lock latch (5) and indicating rod protrudes approximately 0.75in. (19,05 mm.) through firewall.

(13) Remove blank from air outlet (10) and remove adapter from air inlet (9).

(14) Connect and secure (Ref. 70-51-00) connectors (7) and (8) and wirelock.

(15) Close cowls opened in operation (7).

(16) Remove tags and close circuit breakers opened in operations (3) through (6).

(17) CAUTION: IN OPERATION D.(2), IF THE THRUST REVERSER SYSTEM WAS PNEUMATICALLY OPERATED TO REVERSE THRUST POSITION. THEN THE THRUST REVERSER SYSTEM MUST BE PNEUMATICALLY OPERATED TO FORWARD THRUST POSITION.
Operate thrust reverser to forward thrust position (Ref. para. 1, 3 or 4, as applicable).

E. Check Air Motor Travel

Air motor travel is checked by measuring travel of translating cowl as follows:

(1) Tag engine throttle levers.

(2) Open and tag appropriate START AIR VALVE circuit breaker on pilot's overhead circuit breaker panel CB1, zone 210.

(3) Tag appropriate ENGINE START panel switchlights.

(4) With translating cowl in forward thrust position, attach adhesive strips to translating cowl and firewall capping. Mark each strip, measure and record distance between marks.

(5) Operate thrust reverser to reverse thrust position (Ref. para.1.A.).

(6) Using distance recorded in (4) as datum, measure distance travelled by translating cowl from retract to extend position. This should not exceed 27.75in. (704,85 mm).

(7) Remove adhesive strips.

(8) Remove tags and close circuit breakers opened in operations (1), (2) and (3).

(9) Operate thrust reverser to forward thrust position (Ref. para.1.A.).

2. Set Thrust Reverser System

For acceptance standards applicable to translating cowl setting and blocker flap droop following use of thrust reverser on landing, refer to 78-31-07, Maintenance Practices.

WARNING: ENSURE THRUST REVERSER SYSTEM IS ALWAYS LOCKED IN THE REQUIRED POSITION (REF. 78-30-00, SERVICING) WHILE WORK IS IN PROGRESS.

CAUTION: THE AIR MOTOR ALONE MUST NOT BE MANUALLY CYCLED.

Service Bulletins referred to:

R 76-2085 - Introduction of Thrust Reverser Feedback Control Rod
R with Improved Adjustment.
R 76-2141 - Introduction of Debris Guard for Power and Thrust
R Reverser Control Linkage Mixing Mechanism.
R 76-2207 - Rod End of Relay Link Assembly Rotated 90 Degrees and
R Introduction of Self Locking Castellated Nuts.
71-2469 - Introduction of Lock Mechanism with Increased Clearances.
R 76-2675 - Thrust Reverser Feedback Control Linkage - Inverted
R Securing Bolt.
R 76-3201 - Thrust Reverser Selector Valve Control Rod -
R Introduction of a Locking and Anti-Rotation Feature.
78-3608 - Introduction of Detachable Cowl Lock Indicator Housings and Provision for Reverser Locking Out/Manual Wind Features.
71-3632 - Revised Thrust Reverser Secondary Lock Ram Support Bracket and Repositioned Electrical Receptacle.
78-3753 - Introduction of Positive Indication of a Stowed and Locked Translating Cowl.
78-3769 - Secondary Lock Improved Sensor Actuation.
78-4804 - Translating Cowl Forward Proximity Switch Revised Settings.
78-4805 - Improved Secondary Lock Sensor Setting Facility.
Garrett AiResearch S.B.121186-78-1172 - Translating Cowl Gearboxes - Introduction of Locking and Manual Drive Facility.

Referenced Procedures:

71-11-00 Cowling, Engine No.1 and No.3 - Servicing
71-12-05 L.H. and R.H. Upper Hinged Cowls - Servicing
78-31-10 Translating Fairings (Engine No.1 and No.3) - Removal/Installation
78-31-11 Translating Fairing (Engine No.2) - Removal/Installation

A. Set Thrust Reverser Selector Valve Control Linkage

R (1) Equipment required

R UT.993 Rigging Pin

R (2) Ensure thrust reverser is in forward thrust position and
R deactivated (Ref.para.B. operations (1) through (4)).

R (3) Refer to Fig.511 (Sheet 2), remove bolt, nut and cotter
R pin (1) securing control rod (2) to thrust reverser
R selector valve actuating link (3).

R (4) Move aircraft throttle lever, zone 210, until rigging pin
R holes in mixing mechanism assembly (4) gear sector and
R support plate align, then fit rigging pin UT.993.

R (5) Manually withdraw selector valve actuating link (3) to
R forward thrust position (link fully extended).

R NOTE: A magnetic lock within selector valve will hold
R actuating link in fully extended position.

R (6) CAUTION: DO NOT PUT ANY FURTHER REARWARD LOAD ON
R ACTUATING LINK (3).

R Engines without SB 76-3201, release locknut on control
R rod (2). While applying a rearward load to control rod
R (2), adjust length of rod until bolt (1) is an easy fit
R in actuating link (3) and control rod (2).

R Engines with SB 76-3201, release locknut and fit a new
R key washer to control rod (2). While applying a rearward
R load to control rod (2), adjust length of rod until bolt
R (1) is an easy fit in actuating link (3) and control rod
R (2).

R (7) Remove bolt (1) and control rod (2) from link (3), and
R shorten length of control rod by one and a half turns.

R (8) Fit control rod (2) to link (3) and secure with bolt, nut
R and new cotter pin (1).

R (9) Engines without SB 76-3201, secure locknut on control rod
R (2) and check that rod and threads can be seen or felt
R through inspection hole in control rod.

R Engines with SB 76-3201, tighten locknut on control rod
R (2) then lock locknut by bending small tabs on key-washer
R up to locknut and large tab down on flat on control rod
R furthest from locknut tabs. Check that rod end threads
R can be seen or felt through inspection hole in control
R rod.

R (10) Remove rigging pin UT.993

R (11) Remove tags and close circuit breakers opened in
R operation (2) (Ref. para.B. operations (1) through (4)).

B. Set Translating Cowl Locking Mechanism

(1) Tag throttle levers, reverse thrust levers and APU/GND AIR TO REVERSER switches.

(2) Open and tag appropriate THRUST REVERSE circuit breaker on pilot's overheat circuit breaker panel CB1, zone 210.

(3) Open and tag appropriate START AIR VALVE circuit breaker on flight engineer/second officer's aft circuit breaker panel CB3, zone 215.

(4) Tag appropriate ENGINE START panel switchlights.

(5) Open L.H. hinged cowl 413A or 423A and R.H. hinged cowl 414A or 424A for engines No.1 or No.3 (Ref. 71-11-00). Open L.H. upper hinged cowl 433DR and R.H. upper hinged cowl 434DR for engine No.2 (Ref. 71-12-05).

(6) Refer to fig.502, with translating cowl locked in forward position, remove Pre S.B.71-2469, bolt and nut (1); S.B.71-2469, bolt, washer and nut (1). Disconnect relay link (2) from piston rod (3).

(7) Adjust relay link (2) to align with fork end of piston rod (3) while applying hand pressure in direction of arrow 'A' to ensure latch yoke is in fully locked position. Shorten link (up to a maximum of one full turn) to bring fork end into a position where bolt is pointing forward when inserted, then connect to piston rod, Pre S.B.71-2469 fit and secure bolt and nut (1); S.B.71-2469 fit and secure bolt, washer and nut (1) and lock with new cotter pin.

(8) Refer to fig.501, with translating cowl locked in forward position, remove bolt, nut and washer (1) and disconnect relay link (2) from piston rod (3).

(9) Adjust relay link (2) to align with fork end of piston rod (3) while applying hand pressure in direction of arrow 'A' to ensure latch yoke is in fully locked position. Shorten link one complete turn and connect to piston rod fork end, fit and secure bolt, nut and washer (1) and lock with new cotter pin.

(10) Manually cycle thrust reverser (Ref. para.3 or 4) until translating cowl locks are exposed.

(11) Remove lock collar on UT944/2 and release locking screw on UT1134/1 and ensure that latches (5) engage pins on lock yokes (6) (Ref. fig.501 and 502). If latches fail to engage, check latches, lock yokes, lock sequencing valve, secondary lock ram and associated linkages for full and free movement.

(12) Manually cycle thrust reverser to forward thrust position (Ref. para.3 or 4).

(13) Apply retract (upward) hand load to piston rod (3) (Ref. fig.501 and 502) and check that there is no further movement of piston rod in retract direction. If further movement is possible:

(a) Manually cycle thrust reverser (Ref. para.3 or 4) until translating cowl locks are exposed.

(b) Check locking mechanism particularly the linkages for full and free movement.

(c) Manually cycle thrust reverser to forward thrust position (Ref. para.3 or 4).

(14) Close cowls opened in operation (5).

(15) Remove tags and close circuit breakers opened in operations (1) through (4).

C. Set Stowed Sensor Target (S.B.78-3753)

(1) Equipment required:

HU24400 Setting gauge (S.B.78-4804)

(2) Ensure translating cowl in forward thrust position.

(3) Ensure circuit breakers open and systems tagged as detailed in para.B. (1) through (4).

(4) Remove translating cowl L.H. seal assembly and L.H. panel assembly for Engine No.1 or 3 (Ref. 78-31-10) or L.H. panel assembly for Engine No.2 (Ref. 78-31-11).

C (4A) Manually cycle (Ref.para.3 or 4) thrust reverser
C rearward 2 to 4in. (50 to 100 mm.)

C (4B) On L.H. locking mechanism hold handle of UT.1134 while
C releasing lock latch, ease handle to allow secondary
C lock ram to retract. Ensure lock yoke returns to
C locked position. Remove unlocking tool.

C (4C) Manually cycle thrust reverser forward until lock yoke
C is lifted by cam action of mechanical housing lock
C body against lock yoke. Slowly cycle thrust reverser
C forward until lock yoke just moves to locked position.
C Stop cycling immediately.

C (4D) Check lock yoke is engaging lugs on lock body, and
C secondary lock ram is fully retracted.

C (5) Refer to fig.507, slacken nuts (1) and position target support bracket to set gap between sensor face and target plate (fig.508) to between 0.093 (3/32 inch) to 0.125 (1/8 inch). Retighten nuts. Ensure that target plate is approximately parallel with the sensor face.

NOTE: If required, air gap cannot be obtained by adjusting bracket, washers may be added as required between target and bracket. Bolts must still have proper engagement into inserts.

C (6) Refer to fig.507, slacken bolts (2) and position target to set the distance between the aft edge of the sensor and the leading edge of the target plate (fig.508) between 0.750 (3/4 inch) to 0.875 (7/8 inch). Retighten bolts (2).

NOTE: If target overlap minimum dimension is not attainable, target attach slots may be further elongated 1/8 inch.

C (7) Remove manual cycling equipment, lock sequencing valve unlocking tool UT.944/2 and if applicable air motor brake release adapter, 1702211.

C (8) Fit and secure translating cowl L.H. seal assembly and L.H. panel assembly for Engines No.1 or 3 (Ref. 78-31-10), or L.H. panel assembly for Engine No.2 (Ref. 78-31-11).

C (9) Remove tags and close circuit breakers opened in operation (2).

C (10) Deleted.

C (11) Deleted.

. C (12) Deleted.

C (13) Deleted.

C (14) Deleted.

D. Set Air Motor

(1) Effect at least two air motor cycles (Ref. para.1.B.) between forward and reverse thrust, ending in reverse position.

E. Set Cold Stream Reverser

(1) Equipment required:

1702202	(Snap-on CPT.101)	Translating cowl manual cycling adapter (Pre S.B.78-3608)
1703094	(Snap-on 1209556)	Extension 6in.
1702201	(Snap-on KF.4)	Speed handle
UT.986/1		Translating cowl setting gauge
UT.924/1		Translating cowl checking gauge
UT.944/2		Translating cowl unlocking tool
UT.1134/1		Translating cowl unlocking tool

(2) Ensure circuit breakers open and systems tagged as detailed in para.B. (1) through (4).

(3) Open L.H. hinged cowls 413A or 423A and R.H. hinged cowls 414A or 424A for engines No.1 or No.3 (Ref. 71-11-00). Open L.H. upper hinged cowl 433DL and R.H. upper hinged cowl 434DR for engine No.2 (Ref. 71-12-05).

(4) Refer to fig.503, ensure translating cowl flexible drives are disconnected from air motor.

(5) Disconnect interlock gearbox feedback link from relay link (Ref. para.G.(3)).

R

(6) Refer to fig.505 fit unlocking tool UT.944/2 to lock sequencing valve linkage, pull down to release lock and fit collar.

(7) Refer to fig.506 fit unlocking tool UT.1134/1 to secondary lock ram linkage, pull down to release lock and lock tool in this position.

On engines with S.B.71-3632, disconnect lock sensor electrical connector before fitting unlocking tool.

(8) Extend translating cowl as follows:

(a) Pre S.B.78-3608 and Pre AiResearch S.B.121186-78-1172, fit translating cowl manual cycling adapter to right-hand flexible drive; attach manual cycling equipment and wind clockwise to extend translating cowl.

(b) S.B.78-3608 and AiResearch S.B.121186-78-1172, refer to fig.509, remove L.H. or R.H. manual cycling access cover screws (1) and cover (2). Insert standard 0.25in.(6,35 mm.) square drive extension through firewall and locate in gearbox. Attach manual cycling equipment and wind in appropriate direction, indicated on firewall, to extend translating cowl.

(9) Refer to fig.510, position translating cowl so that setting gauge, UT.986/1, can just be inserted between translating cowl mechanical drive housing and screwjack rear bearing housing at any of the six screwjacks (dimension 'A').

NOTE: For reference, 'A' equals 0.5in. (12.7 mm.).

(10) Remove manual cycling equipment. On engines with S.B.78-3608 also remove standard drive extension from gearbox.

(11) Ensure air motor has not been moved from extend position attained in para.D. and that the directional control valve is in the extend position (fig.504 Sheet 1).

(12) Refer to fig.503, connect flexible drives to air motor ensuring flexible drive is not turned through more than 45 degrees to obtain engagement; do not torque tighten bolts at this stage.

(13) Refer to fig.505 and 506, remove unlocking tools and ensure reverser lock latches (5) are engaging lock yokes (6)(fig.501 and fig.502). On engines with S.B.71-3632, reconnect lock sensor electrical connector.

(14) Operate thrust reverser to forward thrust position (Ref. para.1.A.). During this operation, ensure disconnected relay link on L.P. compressor case does not foul.

R (15) Refer to fig.511 (Sheet 1), using checking gauge UT.924/1 with standard feeler gauge check dimension 'B', on both sides, in arc above horizontal centre line, and dimension 'C', in arc between lower screwjacks are within following limits:

'B' 0.175 to 0.225in. (4,45 to 5,71 mm.)
'C' 0.225 to 0.275in. (5,71 to 6,99 mm.)

If outside these limits at all positions, note position in 'B' or 'C' at which smallest difference occurs and adjust dimension 'A' (fig.510) as shown in steps (d) through (k).

C If within these limits at any one or more positions,
C no further adjustment is required provided that:

C (a) The existing 'A' dimension varies no more than
C 0.035 inch.

C (b) The translating cowl pressure seal is seated
C against the firewall.

C (c) The blocker doors have no more than 1/4 inch droop. Upper two doors (1 and 15) are allowed to droop up to 1/2 inch.

C (d) Operate thrust reverser to reverse thrust position (Ref. para.1.A.).

C (e) Refer to fig.503, disconnect flexible drives (1) and (2) from air motor.

C (f) Fit translating cowl manual cycling equipment to flexible drive or gearbox (ref. para.(8)) and wind translating cowl in appropriate direction to adjust dimension 'A' (fig.510) by an amount equal to difference noted in 'B' or 'C'.

C (g) Remove manual cycling equipment.

C (h) Refer to fig.503, connect flexible drives to air motor; do not torque tighten bolts at this stage.

C (j) Operate thrust reverser to forward thrust position (Ref. para.1.A.).

C (k) Recheck dimensions 'B' and 'C' and, if necessary, repeat operations (a) through (f) until required clearance is achieved.

(16) If no adjustment is required to translating cowl; cycle thrust reverser in both directions ending in forward thrust position (Ref. para.1.A.).

(17) Torque tighten flexible drive securing bolts to 25-30 lb.in. (2.82 - 3.39 Nm.).

(18) On engines with S.B.78-3608 refer to fig.509, fit cover (2) to firewall and secure with screws (1).

C (19) Deleted.

F. Set Thrust Reverser Feedback Link

(1) Ensure feedback link disconnected from relay link
R (Ref. para.G.(3)).

R (2) Refer to fig.511 (Sheet 1), with translating cowl in forward thrust position, screw feedback link in or out until dimension 'D' measures 2.020 to 2.125in. (51,31 to 53,975 mm.).

G. Set Thrust Reverser Feedback Control Linkage

R (1) Equipment required

R UT.924/1 Checking gauge
R UT.993 Rigging pin (2 off)

R (2) Ensure thrust reverser deactivated (Ref.para.B.
R operations (1) through (4)).

R (3) Engines with SB 76-2207, Refer to Fig. 511 (Sheet 2),
R remove bolt, washer, nut and cotter pin (11) securing
R feedback link to relay link.

R Engines with SB 76-2675, remove bolt, washer, nut and
R cotter pin (12) securing feedback link to relay link.

R Engines without SB 76-2207 or 76-2675, remove bolt, nut
R and cotter pin (13).

R (4) Refer to Fig.511 (Sheet 1), with translating cowl in
R forward thrust position, adjust feedback link until
R dimension 'D' measures 2.020 to 2.125in. (51,30 to
R 53,975 mm.).

R (5) Using checking gauge UT924/1 with standard feeler gauge
R check dimension 'B' on both sides, in arc above
R horizontal centre line, and dimension 'C' in arc between
R lower screwjacks are within following limits:

R 'B' 0.175 to 0.225in. (4,45 to 5,71 mm.)
R 'C' 0.225 to 0.275in. (5,71 to 6.99 mm.)

R (6) Refer to Fig.511 (Sheet 2), disconnect control rod (6).

R Engines without SB 76-2085, remove bolt, nut and cotter
R pin (5) securing control rod (6) to baulk lever (7).

R Engines with SB 76-2085, remove bolt, nut and cotter pin
R (9) securing control rod (6) to relay lever (10).

R (7) Engines with SB 76-2207, connect feedback link to relay
R link and secure with bolt, washer, nut and new cotter
R pin (11).

R Engines with SB 76-2675, connect feedback link to relay
R link and secure with bolt, washer, nut and new cotter pin
R (12).

R Engines without SB 76-2207 or 76-2675, connect feedback
R link to relay link and secure with bolt, nut and new
R cotter pin (13).

R (8) Move aircraft throttle lever, zone 210, until rigging pin
R holes in mixing mechanism assembly (4) gear sector and
R support plate align then fit rigging pin UT.993.

R (9) Engines without SB 76-2141, move baulk lever (7) to align
R rigging pin hole in lever with rigging pin hole in cam
R (8) then fit rigging pin UT.993.

R Engines with SB 76-2141, move baulk lever (7) to align
R rigging pin hole in lever with rigging pin holes in
R debris guard and cam (8) then fit rigging pin UT.993.

CR NOTE: When aligning the rig pin holes there will usually
CR be a total of 4 holes. Two styles of levers
CR exist. One style has 4 holes of the same diameter
CR in which case the pin will pass through all four
CR holes. The second style has one hole, (third from
CR the top) that is a smaller diameter, in which case
CR alignment is performed by using only the top two
CR holes for the rig pin.

R (10) Engines without SB 76-2085, release locknut on control rod (6) and adjust length of control rod until bolt (5) is an easy fit in baulk lever (7) and control rod. Secure with bolt, nut and new cotter pin (5). Secure locknut on control rod (6) and check that rod end threads can be seen or felt through inspection hole in control rod.

R Engines with SB 76-2085, release locknut on control rod (6) and adjust length of rod until bolt (9) is an easy fit in relay lever (10) and control rod. Secure with bolt, nut and new cotter pin (9). Secure locknut on control rod (6) and check that rod end threads can be seen or felt through inspection hole in control rod.

R (11) Remove rigging pins UT.993 (2 off).

R (12) Ensure ground service system is de-energized (Ref.24-41-00).

R (13) Operate reverse thrust lever to reverse idle position and check further rearward movement is prevented by baulk mechanism, then return lever to forward idle position.

R (14) On pilots overhead circuit breaker panel CB1, zone 210, remove tag and close appropriate THRUST REVERSE circuit breaker.

R (15) Operate thrust reverser to reverse thrust position (Ref.para.1.A.).

R (16) On pilots overhead circuit breaker panel CB1, zone 210, open and tag appropriate THRUST REVERSE circuit breaker.

R (17) Operate reverse thrust lever to forward idle position and check that forward movement of throttle lever is prevented by baulk mechanism, then return reverse thrust lever to reverse idle position.

R (18) On pilots overhead circuit breaker panel CB1, zone 210,
R remove tag and close appropriate THRUST REVERSE circuit
R breaker.

R (19) Operate thrust reverser to forward thrust position
R (Ref.para.1.A.).

R (20) Remove tags and close circuit breakers opened in
R operation (2) (Ref. para.B. operations (1) through (4)).

H. Set Secondary Lock Ram Sensor (S.B.78-3769)

C (1) Ensure thrust reverser in forward thrust position and
R lock indicating rods retracted (underflush).

C (2) Ensure circuit breakers are open and systems tagged as detailed in para.B. (1) through (4).

C (3) Open L.H. hinged cowl 413A or 423A for engine No.1 or 3 (Ref. 71-11-00) or L.H. upper hinged cowl, 433DL for engine No.2 (Ref. 71-12-05).

C (4) Refer to fig.512, slacken bolts and nuts (1) and position sensor support bracket to set gap between face of sensor and target to between 0.20 and 0.225
C inch. Tighten bolts and nuts (2).

(5) Slacken bolts and nuts (2) and position sensor to set distance between upper corner of target and edge of sensor to between 0.325 and 0.350 inch. Tighten bolts and nuts (2).

C (6) Close L.H. hinged cowl 413A or 423A for engine No.1 or 3 (Ref. 71-11-00) or L.H. upper hinged cowl 433DL for engine No.2 (Ref. 71-12-05).

C (7) Remove tags and close circuit breakers opened in operation (2).

J. Set Extend Proximity Switch Sensor Target

(1) Operate thrust reverser system to reverse thrust position (Ref. para.1.A.).

(2) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser mechanical locks (Ref. 78-30-00, Servicing).

(3) Remove R.H. seal assembly for engines No.1 or No.3 (Ref. 78-31-10), or R.H. interface translating fairing for engine No.2 (Ref. 78-31-11).

(4) Refer to fig.513, slacken bolts (2 off) securing target and adjust target until dimension X is 0.050 to 0.150in. (1,27 to 3,81 mm.) then tighten bolts.

(5) Install R.H. seal assembly for engines No.1 or No.3 (Ref. 78-31-10), or R.H. interface translating fairing for engine No.2 (Ref. 78-31-11).

(6) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

(7) Operate thrust reverser system to forward thrust position (Ref. para.1.A.).

3. Manual Cycle Thrust Reverser - Engines without S.B.78-3608 and Pre AiResearch S.B.121186-78-1172

CAUTION: THE AIR MOTOR BRAKE ADAPTER MUST ONLY BE USED WHEN MANUALLY CYCLING A COMPLETE THRUST REVERSER SYSTEM, CORRECTLY SET IN ACCORDANCE WITH THE INSTRUCTIONS DETAILED IN PARA.2. THE AIR MOTOR ALONE MUST NOT BE MANUALLY CYCLED.

Service Bulletins referred to:

78-3608 - Introduction of Detachable Cowl Lock Indicator Housing and Provision for Reverser Locking Out/Manual Wind Features
71-3632 - Revised Thrust Reverser Secondary Lock Ram Support Bracket and Repositioned Electrical Receptacle
Garrett AiResearch S.B.121186-78-1172 - Translating Cowl Gearboxes - Introduction of Locking and Manual Drive Facility.

Referenced Procedures:

71-11-00 Cowling, Engine No.1 and No.3 - Servicing
71-12-05 L.H. and R.H. Upper Hinged Cowls - Servicing
72-03-00 Gas Generator Fairings - Removal/Installation

A. Manual Cycle Thrust Reverser To Reverse Thrust (Extended) Position

(1) Equipment required:

1702202 (Snap-on CPT.101)	Translating cowl, manual cycling adapter
1703094 (Snap-on 1209556)	Extension 6in.
1702201 (Snap-on KF.4)	Speed handle
1702211 (AiResearch 289848)	Air motor brake release adapter
UT.944/2	Translating cowl unlocking tool
UT.1134/1	Translating cowl unlocking tool

(2) Tag throttle levers, reverse thrust levers and APU/GND AIR TO REVERSER switches, zone 215.

(3) Open and tag appropriate THRUST REVERSE circuit breaker on pilot's overhead circuit breaker panel CB1, zone 210.

(4) Open and tag appropriate START AIR VALVE circuit breaker on flight engineer/second officer's aft circuit breaker panel CB3, zone 215.

(5) Tag appropriate ENGINE START panel switchlights.

(6) Remove pylon fairing L.H. access panel 418DL, 428DL or 438DL (Ref. 72-03-00).

(7) Open R.H. hinged cowl 414A or 424A and L.H. hinged cowl 413A or 423A for Engines No.1 and 3 (Ref. 71-11-00). Open R.H. upper hinged cowl 434DR and L.H. upper hinged cowl 433DL for Engine No.2 (Ref. 71-12-05).

(8) Refer to fig.505 fit unlocking tool UT.944/2 to lock sequencing valve, pull down to release lock and fit collar.

(9) Refer to fig.506 fit unlocking tool UT.1134/1 to secondary lock ram, pull down to release lock and lock tool in this position.

On engines with S.B.71-3632, disconnect lock sensor electrical connector before fitting unlocking tool.

(10) With translating cowl in forward thrust position, attach adhesive strips to translating cowl (adjacent to forward edge) and firewall capping. Mark a datum point on each strip in line with centre screwjack.

Manual cycling can be effected by either disconnecting the flexible drives from air motor and attaching cycling equipment to either flexible drive (operation (11)) or by releasing air motor brake and attaching cycling equipment to one of drive outputs on rear of the air motor (operation (12)).

(11) Refer to fig.503, disconnect flexible drives (1) and (2) from air motor. Attach manual cycling equipment to either flexible drive.

(12) Release air motor brake as follows:

(a) Refer to fig.514 (Sheet 1), insert brake release adapter through brake actuator cover and locate internally in diaphragm securing nut, hold adapter handle and screw hand nut 'A' clockwise as far as possible.

(b) Hold adapter handle, screw hand nut 'B' in a clockwise direction until hand nut slips.

NOTE: A built in torque feature prevents overtightening of hand nut.

(c) Attach manual cycling equipment to either drive output on rear of air motor.

(13) Using points marked on strips in operation (10) as a datum, crank in appropriate direction to move translating cowl 27.625in. (701,7 mm.) i.e. just short of full reverse position.

CAUTION: TO AVOID DAMAGE TO AIR MOTOR, THE SYSTEM MUST NOT BE CRANKED TO FULL REVERSE (EXTENDED) POSITION.

If translating cowl is cranked beyond the above limit, return system to retract position and check air motor travel, (Ref. para.1.E.).

(14) Refer to fig.501 and 502, ensure reverser lock latches (5) are engaging latch yokes (6); remove translating cowl unlocking tools (Ref. fig.505 and 506). On engines with S.B.71-3632, reconnect lock sensor electrical connector.

(15) If applicable remove brake release adapter as follows:

(a) Refer to fig.514 (Sheet 1), hold adapter handle and screw hand nut 'B' anti-clockwise to engage air motor brake.

(b) Hold adapter handle, screw hand nut 'A' anti-clockwise to release adapter; remove adapter.

(16) Remove manual cycling equipment.

(17) CAUTION: IF MANUAL CYCLING WAS EFFECTED BY ATTACHING CYCLING EQUIPMENT TO TRANSLATING COWL FLEXIBLE DRIVES THE THRUST REVERSER SYSTEM MUST BE SET (REF. PARA.2). RECONNECTION OF FLEXIBLE DRIVES TO AIR MOTOR WILL BE ACCOMPLISHED DURING THE SETTING PROCEDURE.

Set thrust reverser system (Ref. para.2).

NOTE: Thrust reverser need not be set until after the system has been returned to forward thrust position provided that it is manually cycled forward (Ref. para.B.).

B. Manually Cycle Thrust Reverser to Forward Thrust (Retracted) Position

CAUTION: THRUST REVERSER SYSTEM MUST NOT BE MANUALLY RETRACTED FOLLOWING PNEUMATIC EXTEND.

(1) Equipment required:

1702202 (Snap-on CPT.101)	Translating cowl manual cycling adapter
1703094 (Snap-on 1209556)	Extension 6in.
1702201 (Snap-on KF.4)	Speed handle
1702211 (AiResearch 289848)	Brake release adapter

(2) Deactivate thrust reverser and associated systems as detailed in operations A.(2) through (5).

(3) Effect operation A.(11) or (12).

(4) Crank in appropriate direction to move translating cowl to forward thrust (retracted) position.

(5) If applicable release air motor brake release adapter as follows:

(a) Refer to fig.514 (Sheet 1), hold adapter handle and screw hand nut 'B' anti-clockwise to engage air motor brake.

(b) Hold adapter handle, screw hand nut 'A' anti-clockwise to release adapter; remove adapter.

(6) Remove manual cycling equipment.

(7) CAUTION: IF MANUAL CYCLING WAS EFFECTED BY ATTACHING CYCLING EQUIPMENT TO TRANSLATING COWL FLEXIBLE DRIVES THE THRUST REVERSER SYSTEM MUST BE SET (REF. PARA.2). RECONNECTION OF FLEXIBLE DRIVES TO AIR MOTOR WILL BE ACCOMPLISHED DURING THE SETTING PROCEDURE

Set thrust reverser system (Ref. para.2).

(8) Fit pylon fairing L.H. access panel 418DL, 428DL or 438 DL (Ref. 72-03-00).

(9) Close cowls opened in operation A.(7).

(10) Remove tags and close circuit breakers opened in operations A.(2) through (5).

4. Manual Cycle Thrust Reverser - Engines with S.B.78-3608 and AiResearch S.B.121186-78-1172

CAUTION: THE AIR MOTOR BRAKE ADAPTER MUST ONLY BE USED WHEN MANUALLY CYCLING A COMPLETE THRUST REVERSER SYSTEM, CORRECTLY SET IN ACCORDANCE WITH THE INSTRUCTIONS DETAILED IN PARA.2. THE AIR MOTOR ALONE MUST NOT BE MANUALLY CYCLED.

Service Bulletins referred to:

72-3609 - Interservices Fairing - Quick Release Panel - Air Motor Brake Release.
78-3608 - Introduction of Detachable Cowl Lock Indication Housings and Provision for Reverser Locking Out/ Manual Wind Features.
71-3632 - Revised Thrust Reverser Secondary Lock Ram Support Bracket and Repositioned Electrical Receptacle.
Garrett AiResearch S.B.121186-78-1172 - Translating Cowl Gearboxes - Introduction of Locking and Manual Drive Facility.

Referenced Procedures:

71-11-00 Cowling, Engine No.1 and No.3 - Servicing
71-12-05 L.H. and R.H. Upper Hinged Cowls - Servicing
72-03-00 Gas Generator Fairings - Removal/Installation

A. Manually Cycle Thrust Reverser to Reverse Thrust (Extended) Position

(1) Equipment required:

1703094 (Snap-on 1209556)	Extension 6in.
1702201 (Snap-on KF.4)	Speed handle
1702211 (AiResearch 289848 or 289848-1, S.B.72-3609)	Brake release adapter
UT.944/2	Translating cowl unlocking tool
UT.1134/1	Translating cowl unlocking tool

(2) Tag throttle levers, reverse thrust levers and APU/GND AIR TO REVERSER switches, zone 215.

(3) Open and tag appropriate THRUST REVERSE circuit breaker on flight engineer/second officer's aft circuit breaker panel CB1, zone 210.

(4) Open and tag appropriate START AIR VALVE circuit breaker on flight engineer/second officer's aft circuit breaker panel CB3, zone 215.

(5) Tag appropriate ENGINE START panel switchlights.

(6) Engines without S.B.72-3609, remove pylon fairing L.H. access panel 418DL, 428DL or 438DL (72-03-00).

(7) Engines with S.B.72-3609 refer to fig.514 (Sheet 2), release fasteners (1) and remove air motor brake release access panel (2).

(8) Refer to fig.503, disconnect flexible drives (1) and (2) from air motor, or release air motor brake as follows:

(a) Refer to fig.514 (Sheet 1 or 2) insert brake release adapter through brake actuator cover and locate internally in diaphragm securing nut, hold adapter handle and screw hand nut 'A' clockwise as far as possible.

(b) Hold adapter handle, screw hand nut 'B' clockwise until hand nut slips.

NOTE: A built in torque feature prevents overtightening of hand nut.

(9) Open R.H. hinged cowl 414A or 424A and L.H. hinged cowl 413A or 423A for Engines No.1 and 3 (Ref. 71-11-00). Open R.H. upper hinged cowl 434DR and L.H. upper hinged cowl 433DL for Engine No.2 (Ref. 71-12-05).

(10) Refer to fig.505, fit unlocking tool UT.944/2 to lock sequencing valve, pull down to release lock and fit collar.

(11) Refer to fig.506, fit unlocking tool UT.1134/1 to secondary lock ram, pull down to release lock and lock tool in this position.

On engines with S.B.71-3632, disconnect lock sensor electrical connector before fitting unlocking tool.

(12) With translating cowl in forward thrust position, attach adhesive strips to translating cowl (adjacent to forward edge) and firewall capping. Mark a datum point on each strip in line with centre screwjack.

(13) Refer to fig.509, remove screws (1) and cover (2) from either L.H. or R.H. side of firewall.

(14) Insert standard 0.25in. (6,35 mm.) squared end drive extension through firewall and locate in gearbox.

(15) Connect manual cycling equipment to extension.

(16) Using datum points marked on strips in operation (11) crank gearbox in appropriate direction to move translating cowl 27.625in. (701,7 mm.) i.e. just short of full reverse position.

CAUTION: TO AVOID DAMAGE TO AIR MOTOR, THE SYSTEM MUST NOT BE CRANKED TO FULL REVERSE (EXTENDED) POSITION.

If translating cowl cranked beyond the above limit, return system to forward thrust position and check air motor travel (Ref. para.1.E.).

(17) Refer to fig.501 and 502, ensure reverser lock latches (5) are engaging latch yokes (6); remove unlocking tools UT.994/2 and UT.1134/1 (fig.505 and fig.506). On engines with S.B.71-3632, reconnect lock sensor electrical connector.

(18) If applicable remove brake release adapter as follows:

(a) Refer to fig.514 (Sheet 1 or 2), hold adapter handle and screw hand nut 'B' anti-clockwise to engage air motor brake.

(b) Hold adapter handle and screw hand nut 'A' anti-clockwise to release adapter; remove adapter.

(19) Remove manual cycling equipment and extension.

(20) Refer to fig.509, fit cover (2) to firewall and secure with screws (1).

(21) CAUTION: IF FLEXIBLE DRIVES WERE DISCONNECTED TO ALLOW MANUAL CYCLING THE THRUST REVERSER SYSTEM MUST BE SET (REF. PARA.2). RECONNECTION OF FLEXIBLE DRIVES TO AIR MOTOR WILL BE ACCOMPLISHED DURING THE SETTING PROCEDURE.
Set thrust reverser system (Ref. para.2).

NOTE: Thrust reverser need not be set until after the system has been returned to forward thrust position provided that it is manually cycled forward (Ref. para.B.).

B. Manually Cycle Thrust Reverser to Forward Thrust (Retracted) Position

CAUTION: THRUST REVERSER SYSTEM MUST NOT BE MANUALLY RETRACTED FOLLOWING PNEUMATIC EXTEND.

(1) Equipment required:

1703094 (Snap-on 1209556)	Extension 6in.
1702201 (Snap-on KF.4)	Speed handle
1702211 (AiResearch 289848 or 289848-1, S.B.72-3609)	Brake release adapter

(2) Deactivate thrust reverser and associated systems as detailed in para. A.(2) through (5).

(3) Refer to fig.503, disconnect flexible drives (1) and (2) from air motor, or release air motor brake as follows:

(a) Refer to fig.514 (Sheet 1 or 2), insert brake release adapter through brake actuator cover and locate internally in diaphragm securing nut, hold adapter handle and screw hand nut 'A' clockwise as far as possible.

(b) Hold adapter handle, screw hand nut 'B' clockwise until hand nut slips.

NOTE: A built in torque feature prevents overtightening of hand nut.

(4) Refer to fig.509, remove screws (1) and cover (2) from either L.H. or R.H. side of firewall.

(5) Insert standard 0.25in. (6,35 mm.) squared end drive extension through firewall and locate in gearbox.

(6) Connect manual cycling equipment to extension.

(7) Crank gearbox in appropriate direction to move translating cowl to forward thrust position.

(8) If applicable remove brake release adapter as follows:

(a) Refer to fig.514 (Sheet 1 or 2), hold adapter handle and screw hand nut 'B' anti-clockwise to engage air motor brake.

(b) Hold adapter handle and screw hand nut 'A' anti-clockwise to release adapter; remove adapter.

(9) CAUTION: IF FLEXIBLE DRIVES WERE DISCONNECTED TO ALLOW MANUAL CYCLING THE THRUST REVERSER MUST BE SET (REF. PARA.2). RECONNECTION OF FLEXIBLE DRIVES TO AIR MOTOR WILL BE ACCOMPLISHED DURING THE SETTING PROCEDURE.
Set thrust reverser system (Ref. para.2).

(10) Engines without S.B.72-3609, fit pylon fairing L.H. access panel 418DL, 428DL or 438DL (Ref. 72-03-00).

(11) Engines with S.B.72-3609 refer to fig.514 (Sheet 2), fit air motor brake release access panel (2) and secure fasteners (1).

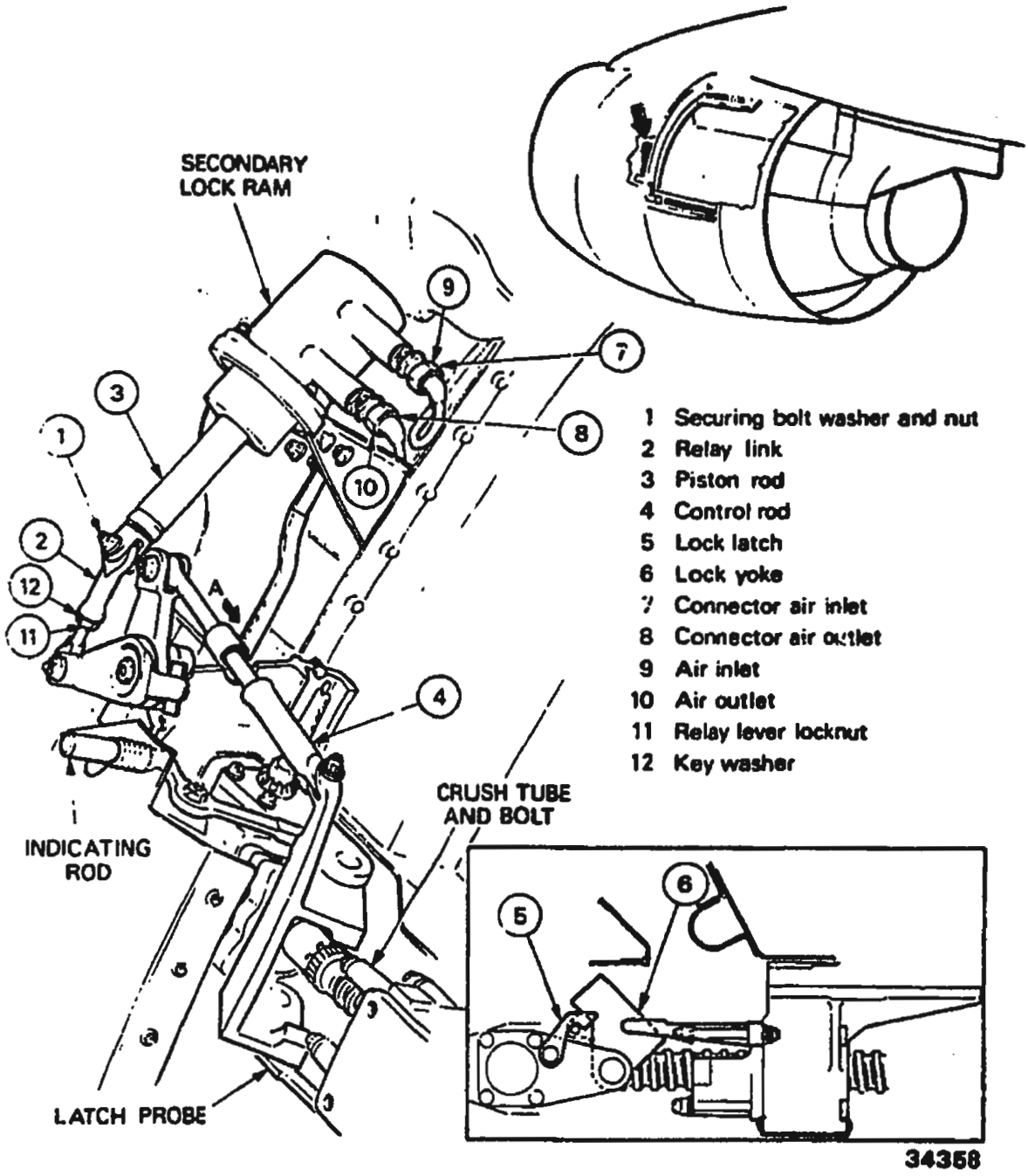
(12) Close cowls opened in operation A.(8).

(13) Remove tags and close circuit breakers opened in operation (2).

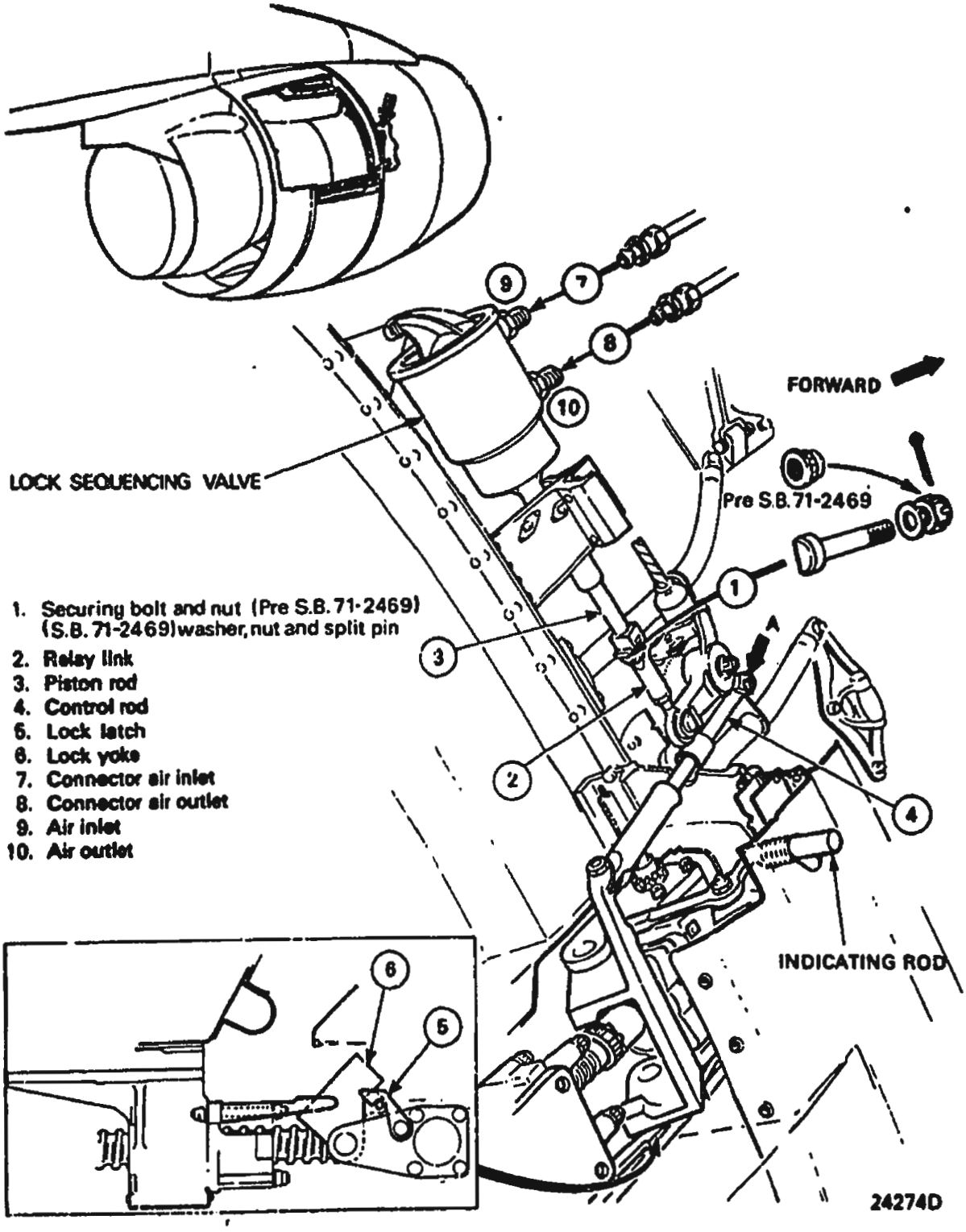
5. Replaced Components, Rigging Requirement Chart

A. Para.2. identifies the rigging operations to be carried out subsequent to component replacement on the thrust reverser system, and are listed in the chart given below.

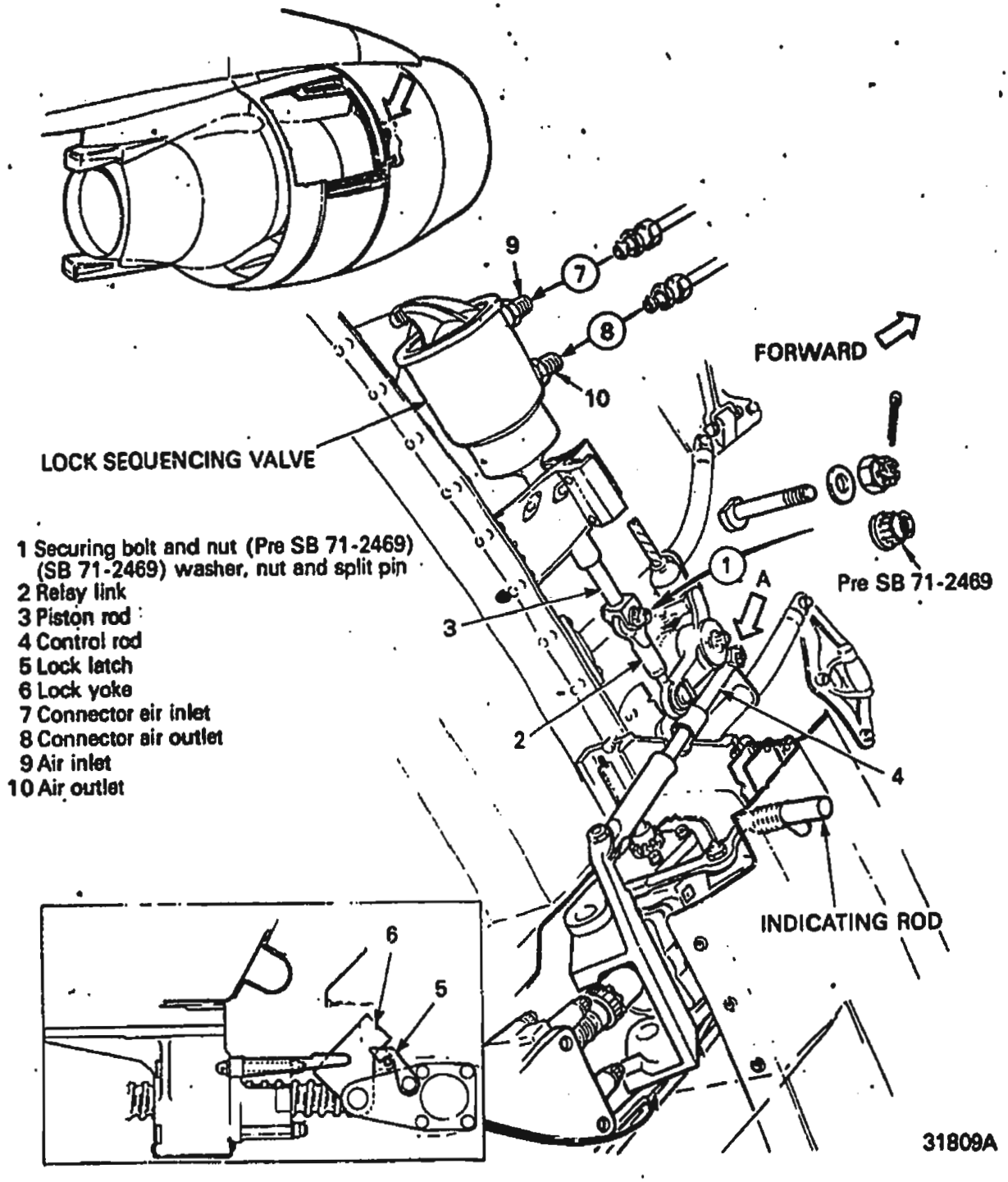
Component replaced	Rigging operation required
Air Motor	D, E, F, G, J
Air Motor Drive Cables	D, E, F, G, J
P.R.S.O.V.	J
Pressure Switch	J
Primary Lock Ram	B, J
Secondary Lock Ram	B, H, J
Selector Valve	A, J
Stow Sensor	C, J
Extend Sensor	C, J
Secondary Lock Ram Sensor	H, J
Screwjack No.1 to No.5	D, E, J
Screwjack No.6	D, E, F, G, J
Gearboxes No.1 to No.5	D, E, J
Gearbox No.6	D, E, F, G, J
Locking Mechanism	B, J



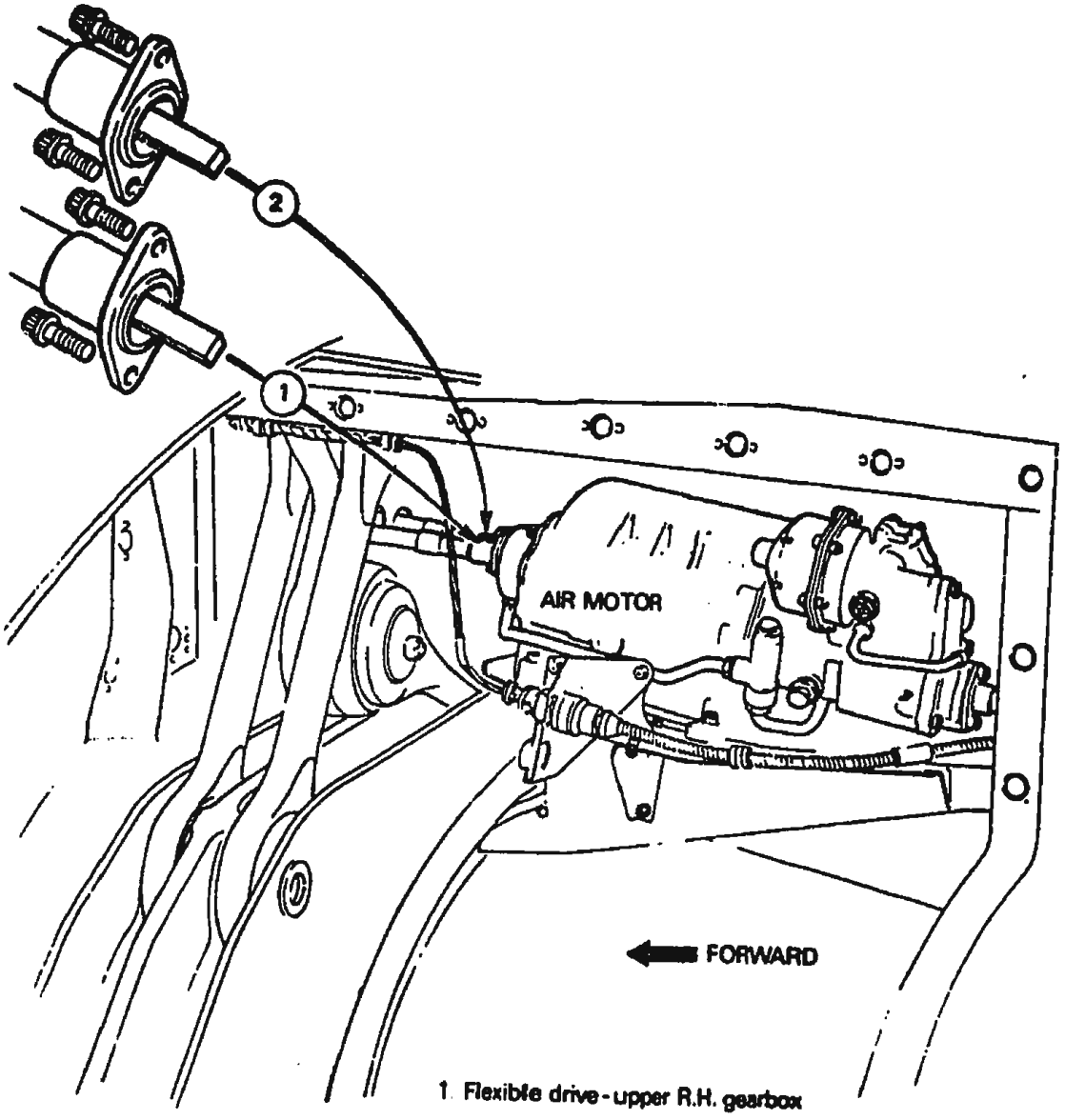
Translating cowl L.H. lock setting
Fig.501



Translating cowl R.H. lock setting - Engines without S.B.78-7185
Fig.502 (Sheet 1)



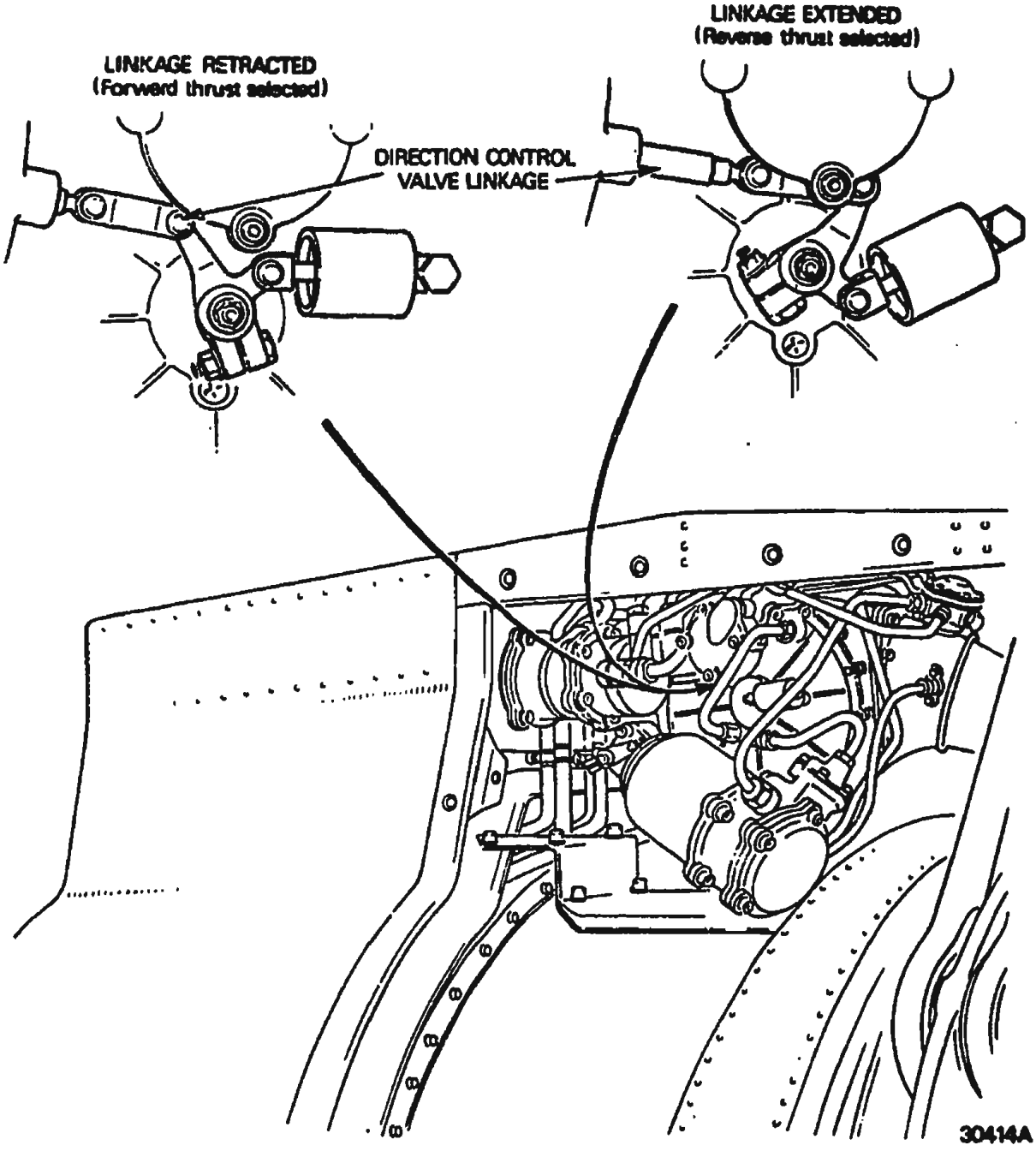
Translating cowl R.H. lock release - Engines with S.B.78-7185
Fig.502 (Sheet 2)



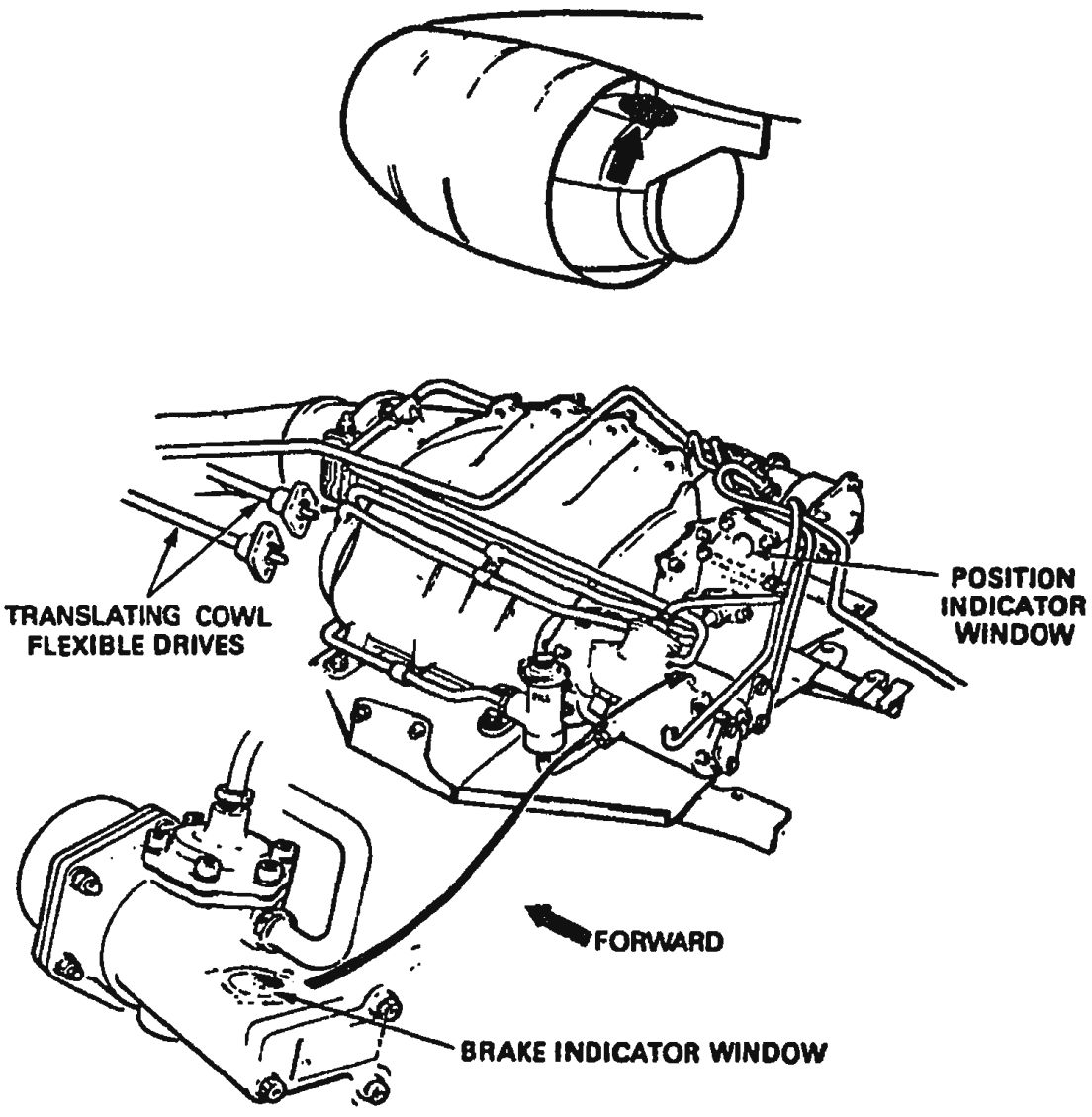
1. Flexible drive - upper R.H. gearbox
2. Flexible drive - upper L.H. gearbox

32525

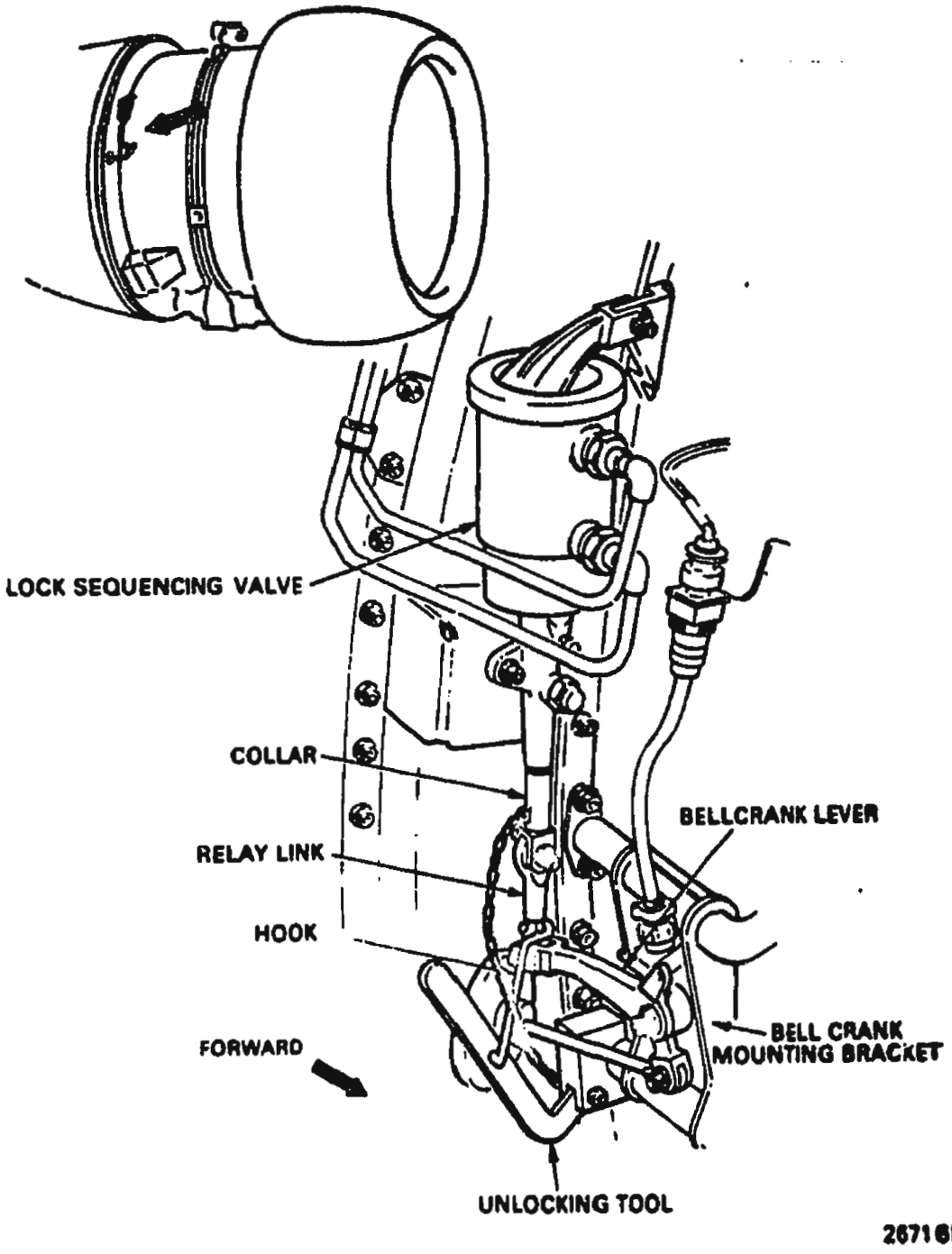
Flexible drive disconnect
Fig.503



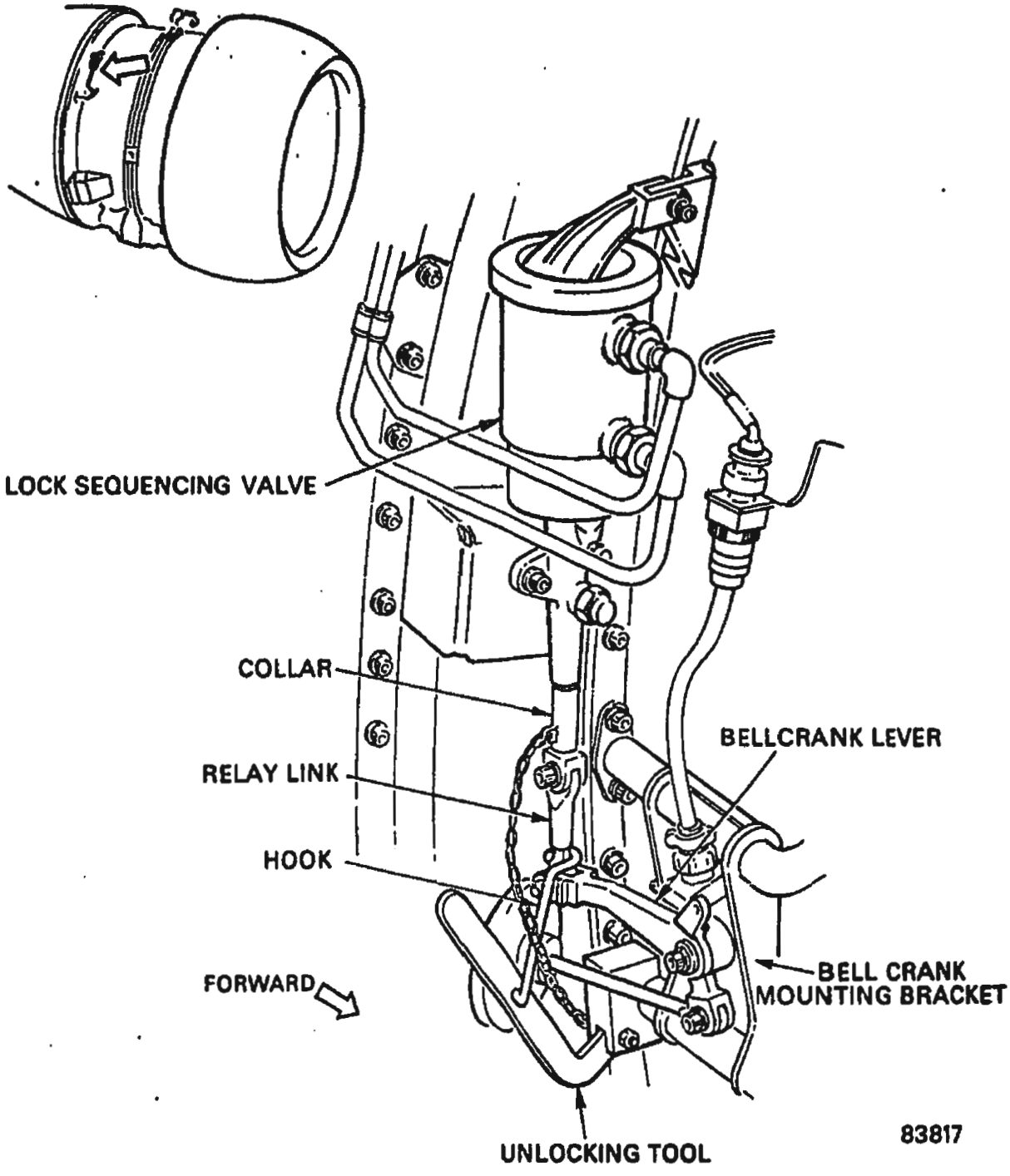
Air motor setting
Fig.504 (Sheet 1)



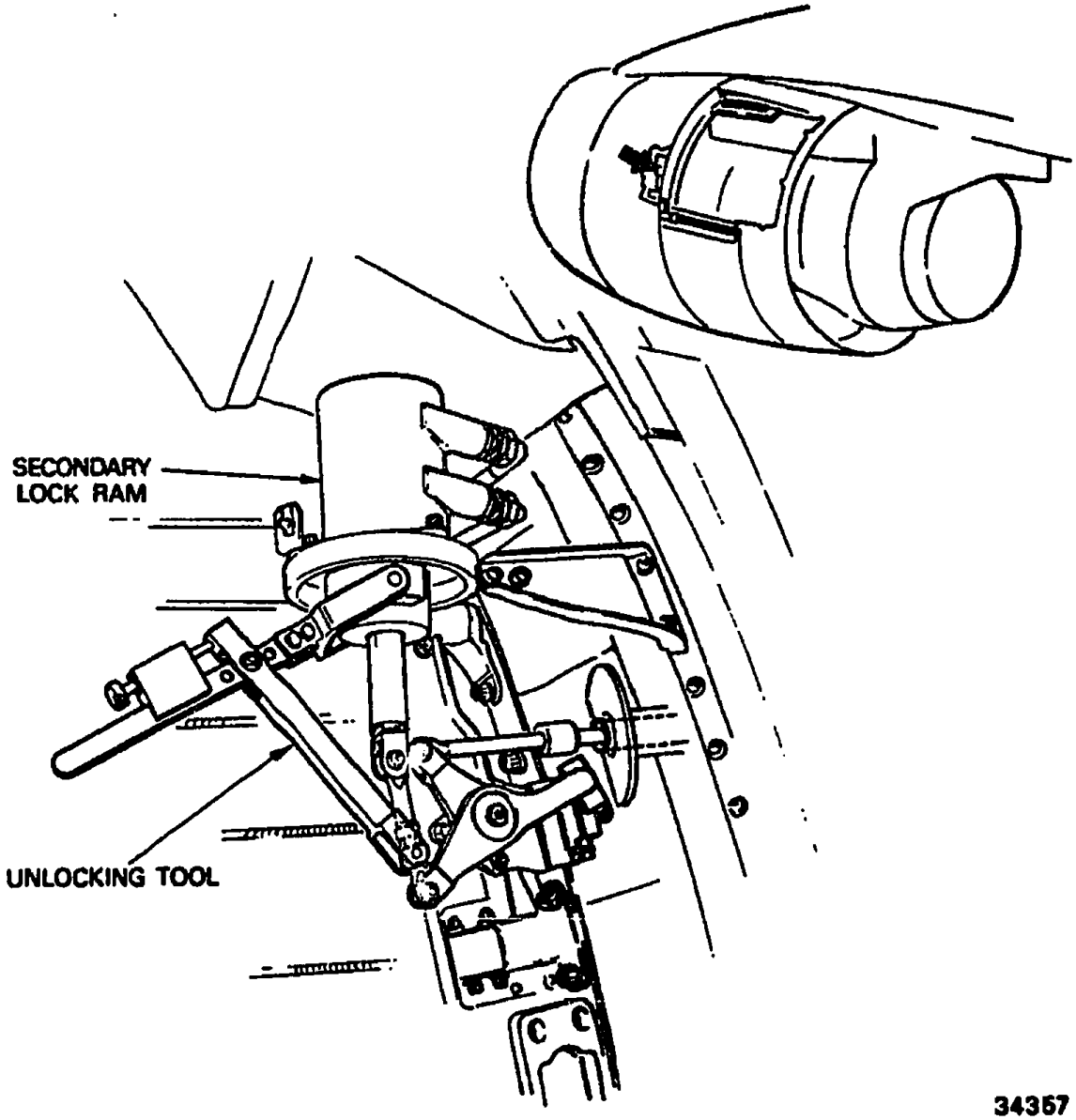
Air motor setting
Fig.504 (Sheet 2)



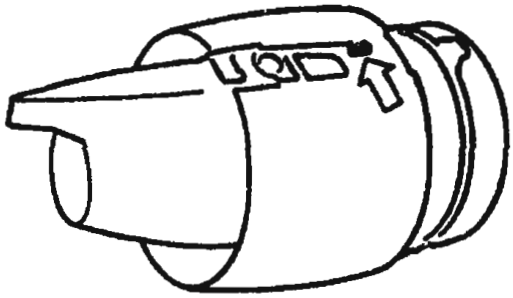
Translating cowl R.H. lock release - Engines without S.B.78-7185
Fig.505 (Sheet 1)



Translating cowl R.H. lock release - Engines with S.B.78-7185
Fig.505 (Sheet 2)



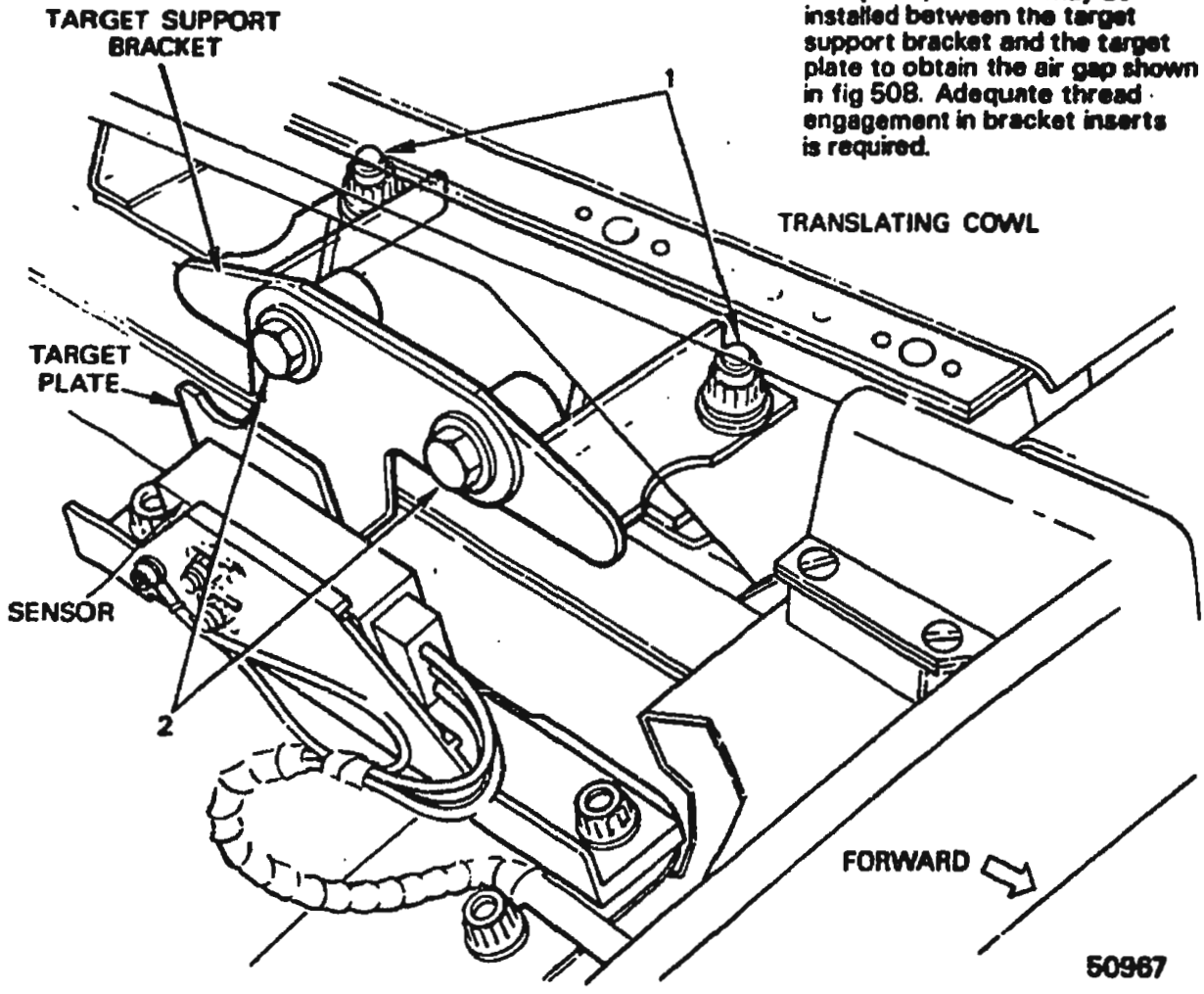
Translating cowl L.H. lock release
Fig.506



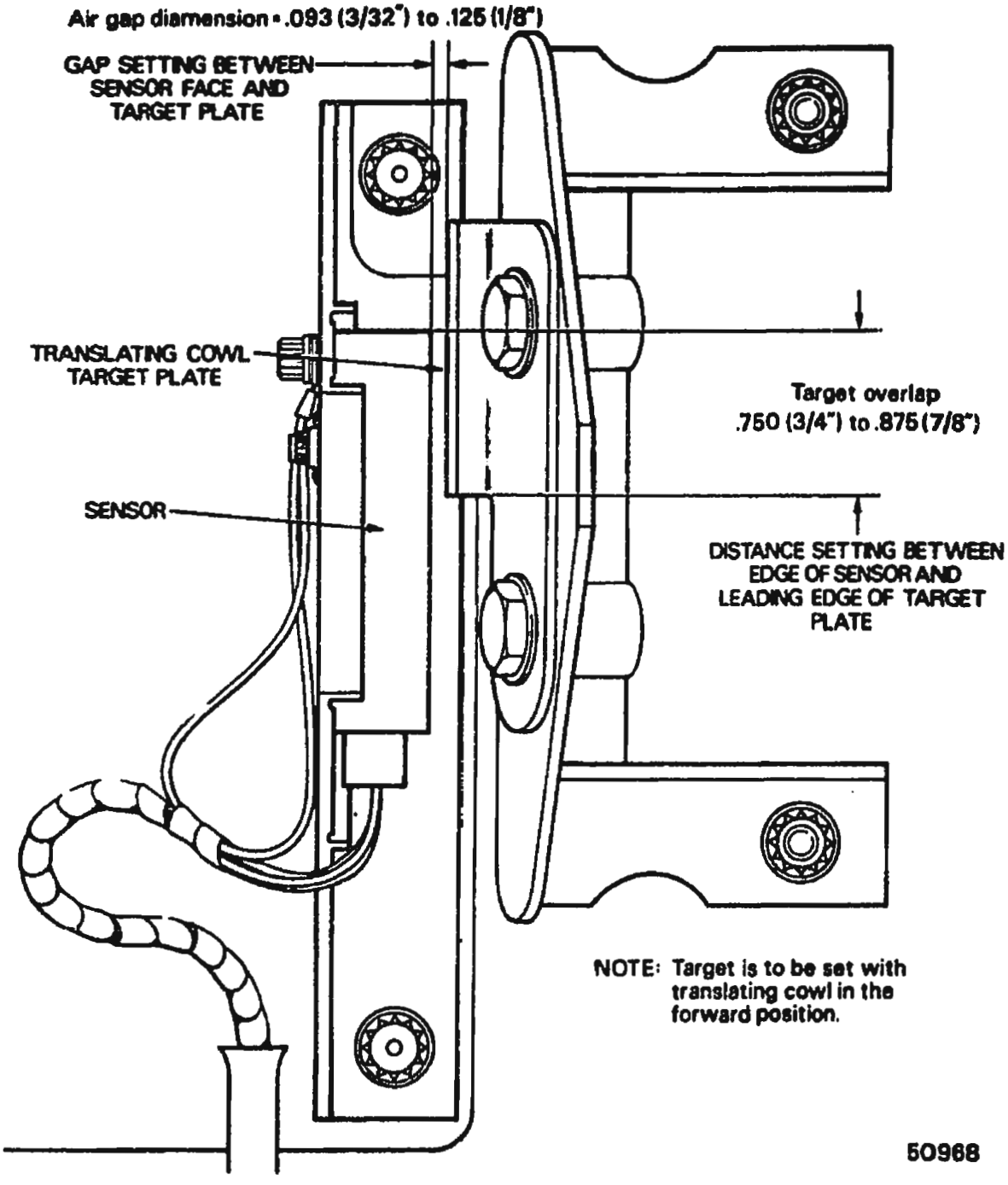
1. Nuts (2 off) - Gap setting
2. Bolts (2 off) - Distance setting

NOTE: Longer bolts may be substituted if required

NOTE: If required, washers may be installed between the target support bracket and the target plate to obtain the air gap shown in fig 508. Adequate thread engagement in bracket inserts is required.



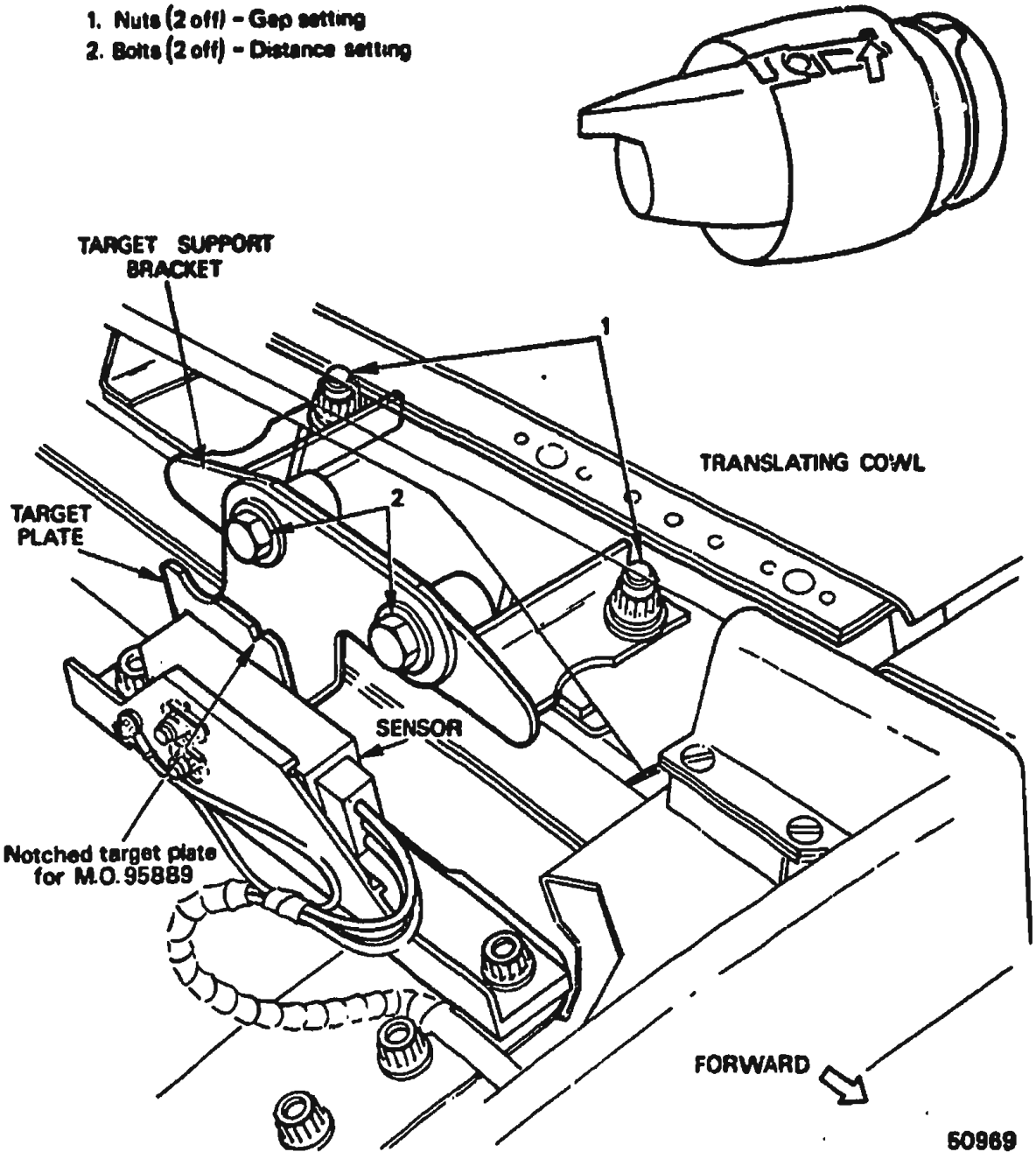
C C Stowed sensor and target
Fig.507


Air gap diamension = .093 (3/32") to .125 (1/8")
GAP SETTING BETWEEN SENSOR FACE AND TARGET PLATE
TRANSLATING COWL TARGET PLATE
SENSOR
Target overlap .750 (3/4") to .875 (7/8")
DISTANCE SETTING BETWEEN EDGE OF SENSOR AND LEADING EDGE OF TARGET PLATE
NOTE: Target is to be set with translating cowl in the forward position.
50968

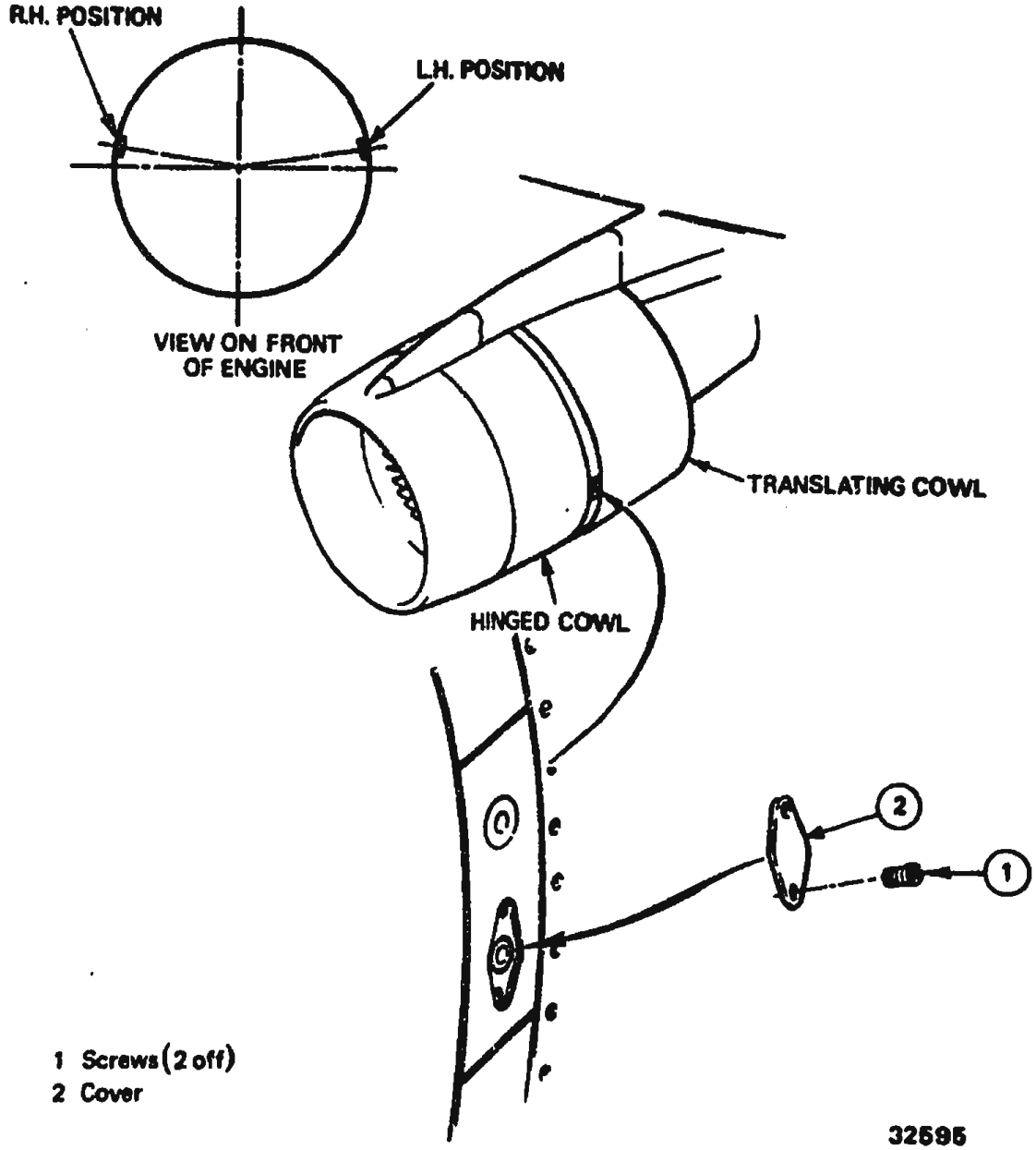
C
C

Stowed sensor target setting
Fig.508

1. Nuts (2 off) - Gap setting
2. Bolts (2 off) - Distance setting



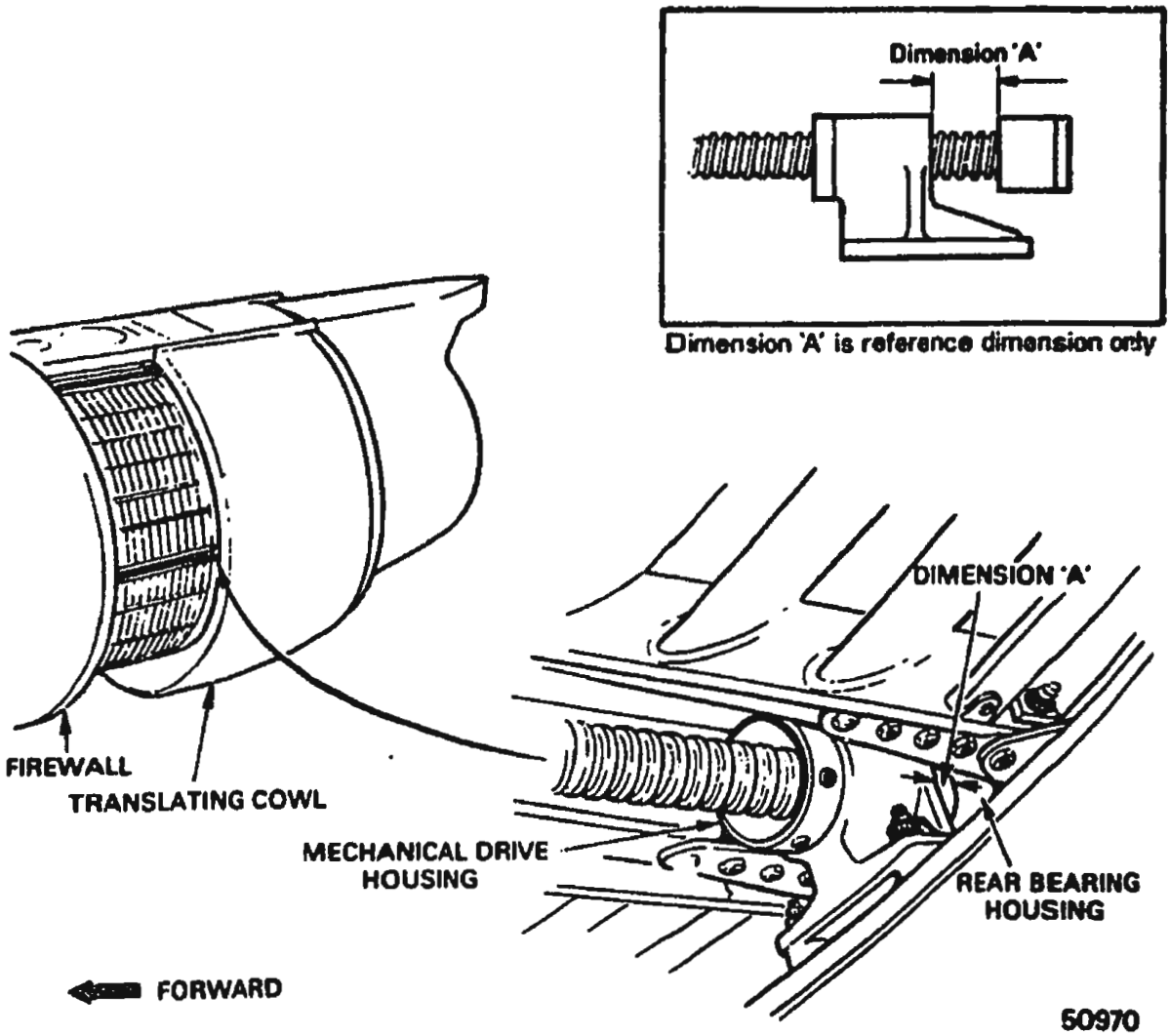
C Stowed sensor target setting (M.0.95889)
C Fig.508A



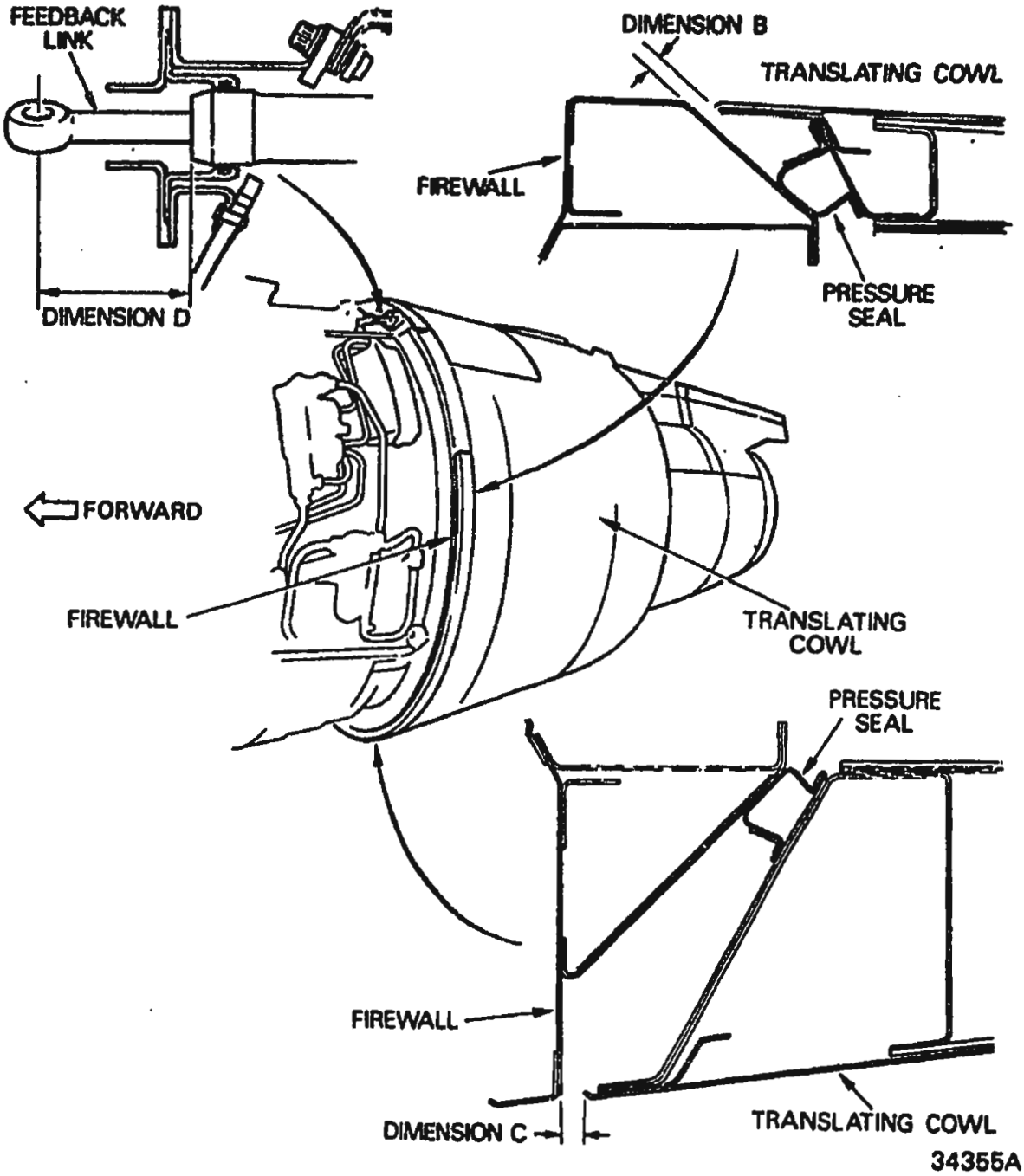
1 Screws (2 off)
2 Cover

32695

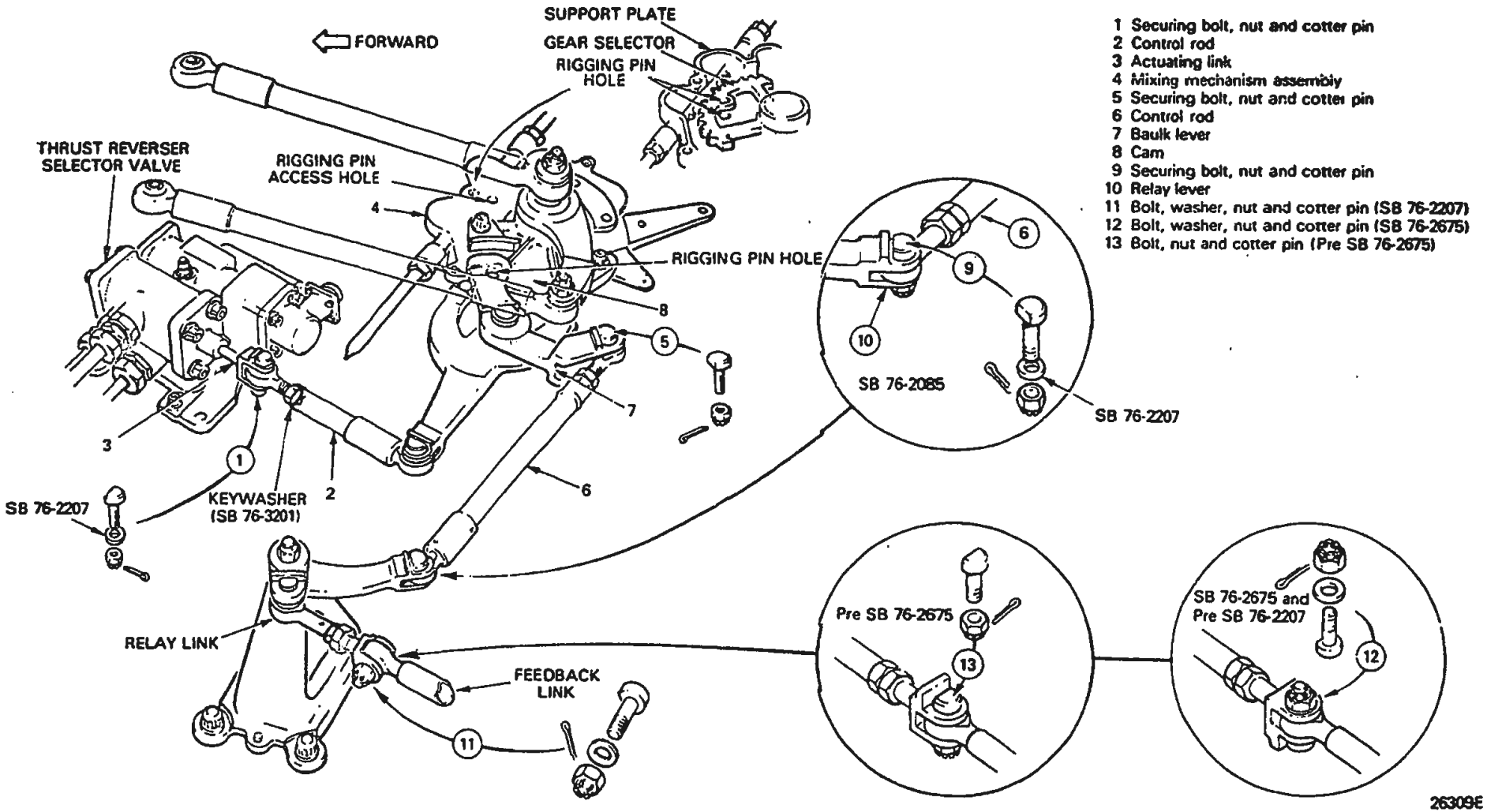
Manual cycling access S.B.78-3608 (M.O.95653)
Fig.509



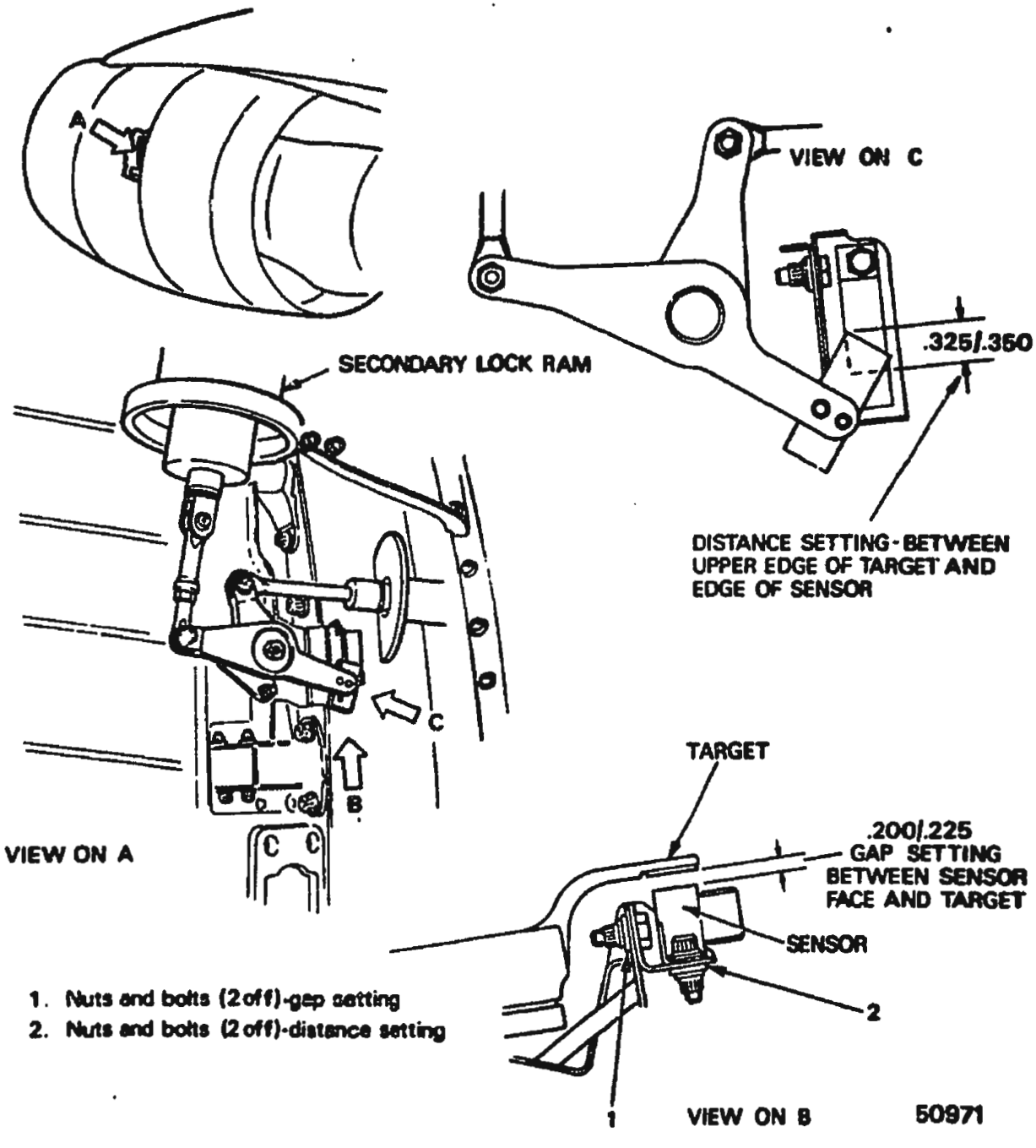
C C Translating cowl setting
Fig.510



Translating cowl and feedback link setting
Fig.511 (Sheet 1)

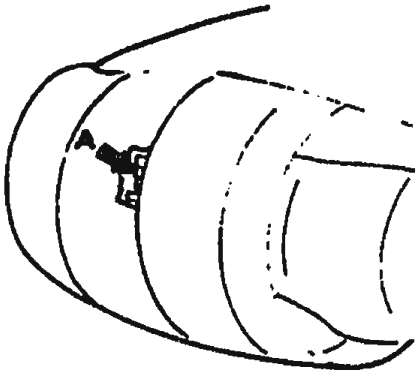


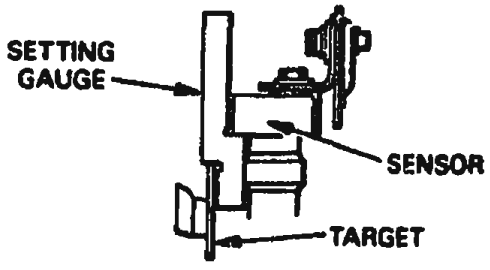
R Thrust reverser control linkage
R Fig.511 (Sheet 2)



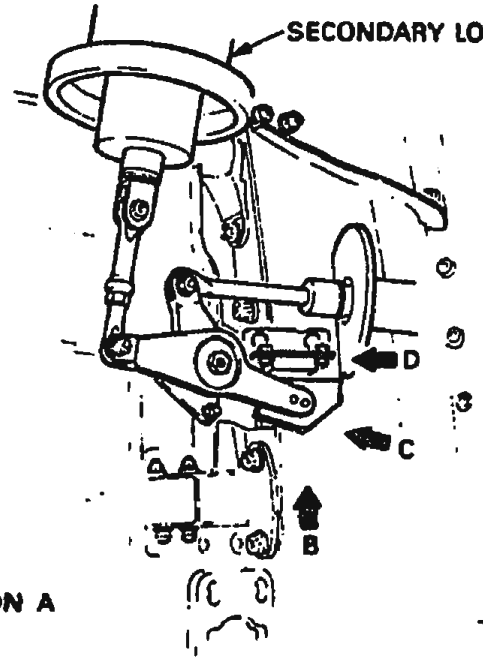
1. Nuts and bolts (2 off)-gap setting
2. Nuts and bolts (2 off)-distance setting

C C Secondary lock ram sensor setting
Fig.512

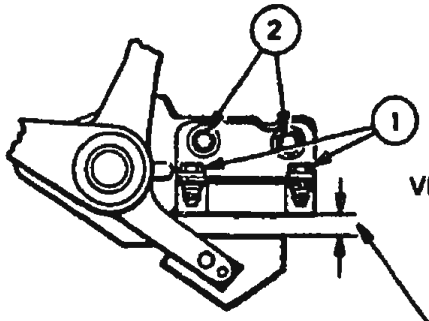




VIEW ON D WITH SETTING GAUGE IN POSITION

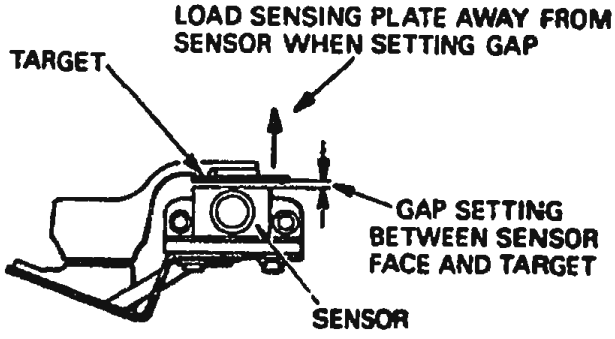


VIEW ON A



VIEW ON C

DISTANCE SETTING-BETWEEN UPPER EDGE OF TARGET AND EDGE OF SENSOR

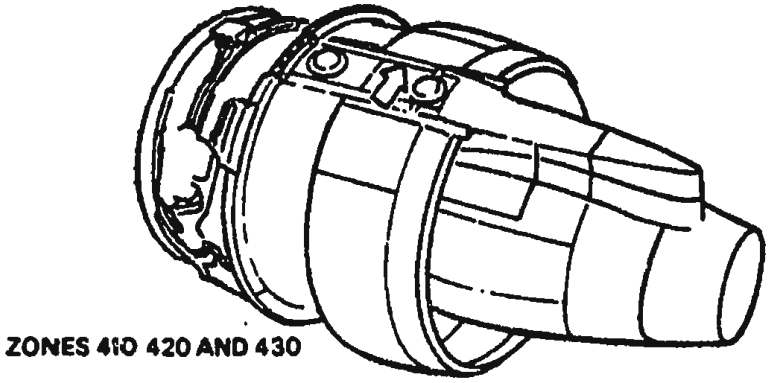


VIEW ON B

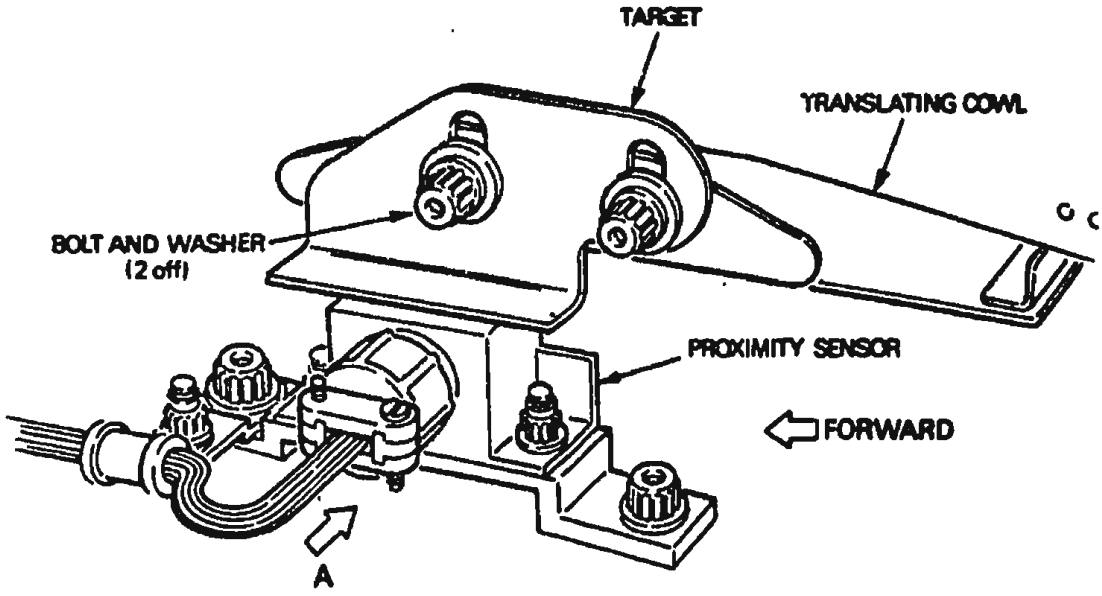
1 Nuts and bolts (2 off)-gap setting
2. Nuts and bolts (2 off)-distance setting

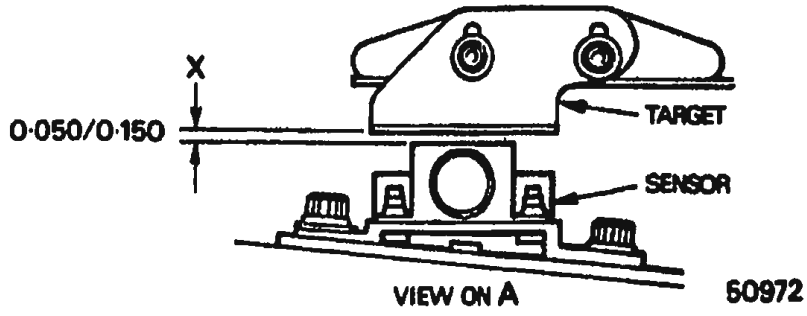
38261

Secondary lock ram sensor setting (S.B.78-4805)
Fig.512A
Not accomplished on TWA aircraft thru 11031

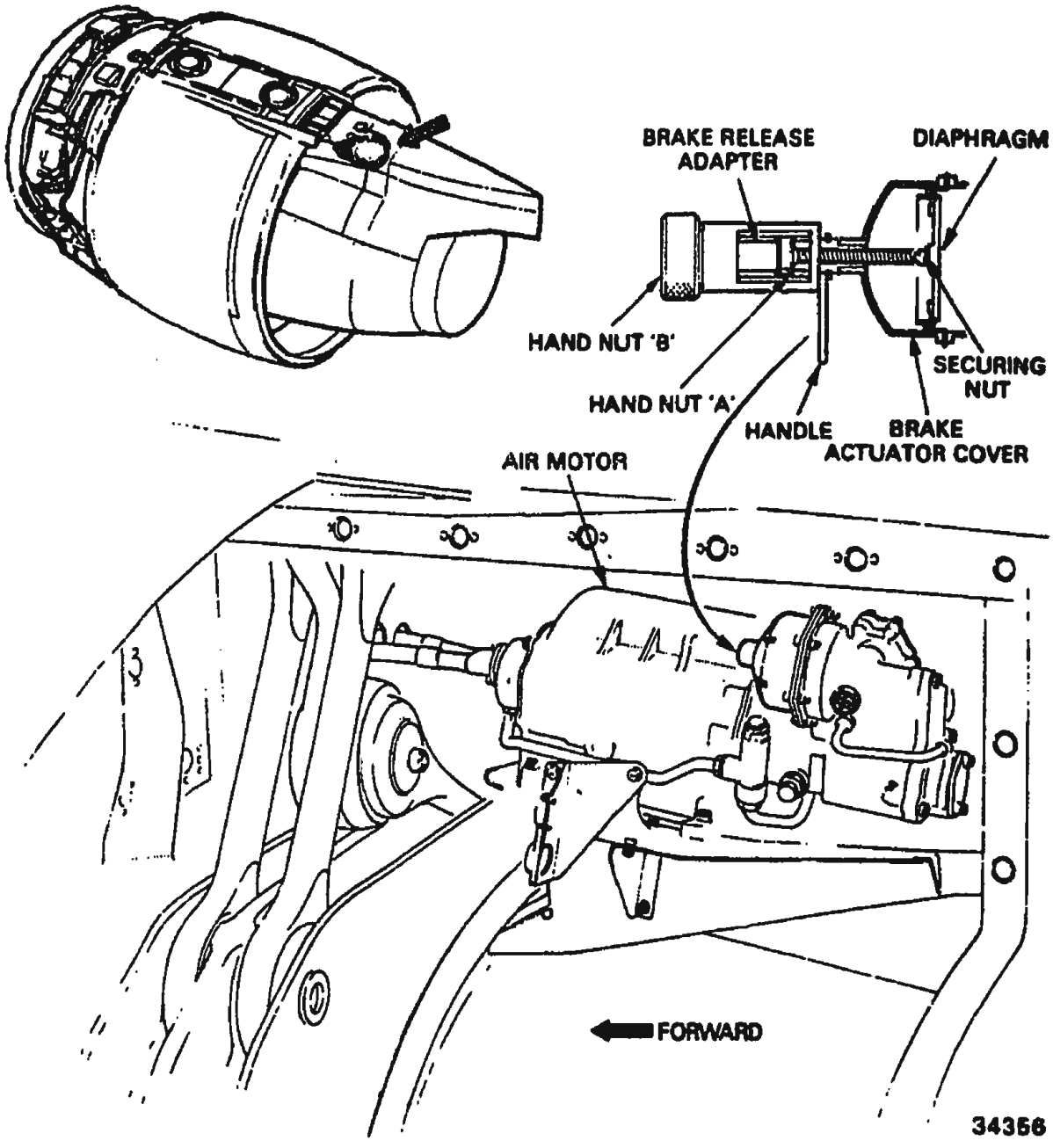


ZONES 410 420 AND 430

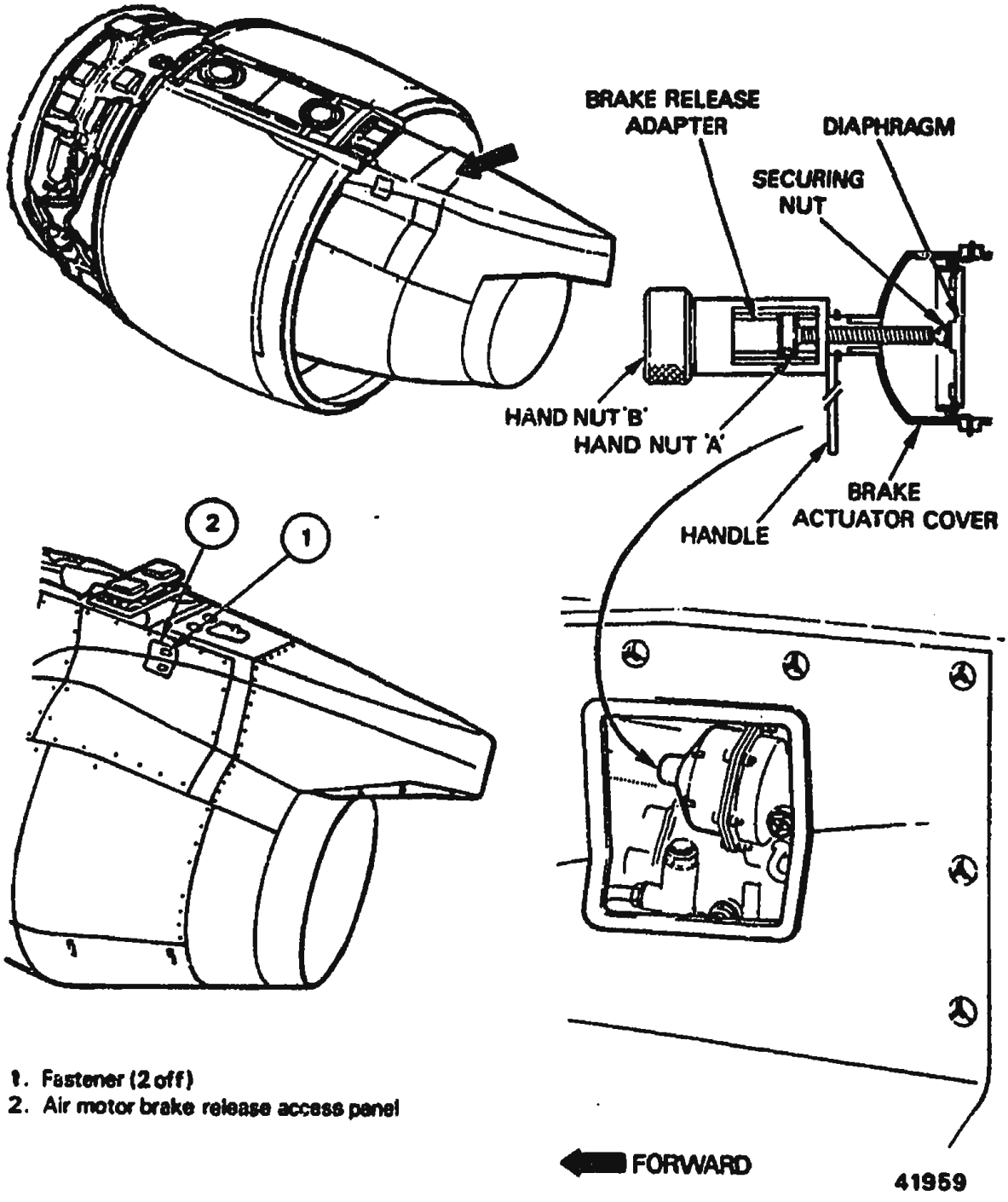




C Extend proximity switch sensor target setting
C Fig.513



Air motor brake release access (Engines without S.B.72-3609)
Fig.514 (Sheet 1)



1. Fastener (2 off)
2. Air motor brake release access panel

Air motor brake release access (Engines with S.B.72-3609)
Fig.514 (Sheet 2)

THRUST REVERSER - INSPECTION/CHECK

The following procedure should only be used as directed in Alert Service Bulletin RB.211-78-A3672, para.4.A.(3).

1. Check Translating Cowl to Firewall Clearance (S.B.78-3282, Pre S.B.78-3753 and Pre S.B.78-3769)

   Service Bulletins referred to:

   S.B.78-3282 - Deactivation of Hot Stream Spoiler System
   S.B.78-3753 - Indication of Positive Indication of a Stowed and Locked Translating Cowl
   S.B.78-A3672 - Cold Stream Translating Cowl - Check for Unlocked Condition
   S.B.78-3769 - Secondary Lock Improved Sensor Activation

   A. With thrust reverser system in forward thrust position, check clearance between translating cowl front edge and firewall is not greater than 0.55in. (13,97 mm.).

   B. If clearance greater than 0.55in. (13,97 mm.) and REVERSER OPERATING light is off, proceed as follows:

      (1) Inspect lock sequencing valve and secondary lock ram lock latch mechanisms and rectify as necessary.

      (2) Check setting of translating cowl locking mechanisms (Ref. 78-30-00, Adjustment/Test) and rectify as necessary.

      (3) Manually cycle thrust reverser system (Ref. 78-30-00, Adjustment/Test) to forward thrust position and check clearance between translating cowl front edge and firewall is not greater than 0.55in. (13,97 mm.) and that lock indicators are retracted.

      (4) Functionally test thrust reverser system (Ref. 78-30-00, Adjustment/Test).

THRUST REVERSER SYSTEM IN-FLIGHT LOCKING - MAINTENANCE PRACTICES

1. General

The level of safety required from the thrust reverser system is that the system must be capable of sustaining any two failures without danger of inadvertent deployment. In the event that a malfunction occurs which will not be rectified before the next flight, the above safety level must be maintained by locking the system.

Despatch with the thrust reverser locked is not permissible if malfunction condition does not fall within the categories given
R in para.2, or the appropriate airworthiness authority approved
R Configuration Deviation List and Master Minimum Equipment List, or if during the locking procedures any of the actions or conditions cannot be achieved. In these circumstances the system must be rectified.

After locking, the malfunction must be diagnosed and rectified before the system is used again.

2. System Malfunction and Action Required

Service Bulletins referred to:

S.B.72-3609 - Interservices Fairing - Quick Release Panel - Air Motor Brake Release
S.B.78-3571 - Introduction of Pressure Regulator Remote Deactivation
S.B.78-3608 - Introduction of Detachable Cowl Lock Indicator Housing
Garrett AiResearch S.B.121186-78-1172 - Translating Cowl Gearboxes - Introduction of Locking and Manual Drive Facility

A. System Fails to Give Correct Light Indication in Forward Thrust Position.

(1) If the 'REVERSER IN TRANSIT' light remains 'ON', thrust reverser operation may continue provided that the following conditions are satisfied:

(a) The reverser pressure indicating light is functioning correctly.

(b) The clearance between the forward edge of the translating cowl and the firewall is not greater than 0.450in. (11,43 mm.).

(c) The translating cowl lock indicator rods are underflush.

It is recommended that the malfunction be diagnosed and rectified at the earliest opportunity.

(2) If reverser pressure indicating light remains 'ON' proceed as follows:

(a) Ensure R.H. lock indicating rod is underflush.

(b) Fit translating cowl in-flight lockbars or plates as applicable (Ref.Para 3A or 3B)

(c) Lock pressure regulating and shut-off valve (Ref. para.3.C.) or if S.B.78-3571 incorporated, deactivate pressure regulating and shut-off valve (Ref. para.3.D.).

(d) Connect external air supply to high pressure ground connector or start A.P.U.

(e) Ensure reverse thrust select lever in forward idle position.

(f) Connect and energise external power system (Ref. 24-41-00).

(g) Ensure appropriate high pressure valve, engine isolation valve, duct isolation valve and cross bleed valves are selected open.

(h) Lift and hold APU/GND AIR TO REVERSER switch and check pressure indicating light is 'OFF'. Release switch.

On engines with S.B.78-3571, if reverser pressure indicating light remains 'ON', then the pressure regulating and shut-off valve must be locked as for engines without S.B.78-3571 (Ref. para.3.C.).

R (i) On engines with SB 78-3608, after manually locking
R the pressure regulating shut-off valve, repeat
R steps (d) through (h). If the reverser pressure
R indicating light stays 'ON', the R.H. and L.H.
R flexible drives must be disconnected at the
R airmotor. Secure the flex shafts to ensure that
R the inner drive shaft is retained and to avoid
R damage to other components.

R (j) If the reverser pressure indicating light remains
R 'ON' without doing steps (d) through (h), the
R thrust reverser must still be locked out and the
R main flexible drive shafts disconnected.

(k) Disconnect external air supply or stop A.P.U.

(l) De-energise external power system (Ref. 24-41-00).

(m) Prior to diagnosis and rectification of malfunction effect applicable unlocking operations (Ref. para.5.).

B. System Fails to Operate when Reverse Thrust Selected

(1) Ensure R.H. lock indicator rod is underflush.

(2) Fit translating cowl in-flight lock bars or plates (Ref. para.3.A. or 3.B.).

(3) Lock pressure regulating and shut-off valve (Ref. para.3.C.) or if S.B.78-3571 incorporated, deactivate pressure regulating and shut-off valve (Ref. para.3.D.).

(4) Prior to diagnosis and rectification of malfunction effect applicable unlocking operations (Ref. para.5.).

C. System Fails in Reverse or Mid-Travel Position - Engines without S.B.78-3608 and Garrett AiResearch S.B.121186-78-1172

Referenced Procedures:

72-03-00 Gas Generator Fairings - Removal/Installation

(1) Equipment required:

1702202 (Snap-On CPT.101)	Translating cowl manual cycling adapter.
1703094 (Snap-On 1209556)	Extension 6in.
1703095 (Snap-On 1209557)	Extension 12in.
1702201 (Snap-On KF.4)	Speed handle
1700046 (Snap-On KFU.80)	Universal drive

(2) Remove pylon fairing L.H. access panel 418DL, 428DL or 438DL (Ref. 72-03-00).

(3) Refer to fig.201, disconnect flexible drives (1) and (2) from air motor.

(4) Attach manual cycling equipment to L.H. flexible drive and wind in clockwise direction to position translating cowl in forward thrust. If translating cowl does not move, transfer equipment to R.H. flexible drive and wind in anti-clockwise direction.

If drive is positive, position translating cowl in forward thrust and effect operations (5), (6), (7), (8) and (9).

The clearance between the forward edge of the translating cowl and the firewall should not be greater than 0.450 in. (11.43mm).

If drive is not positive, effect operations in para. 4.A., B. or C. as applicable before effecting operations (5) through (9).

NOTE: It is not necessary to re-connect main flexible drives to gearboxes No.1 and No.6, but it is recommended that flexible drives are securely restrained to avoid damage to other components.

(5) Lock pressure regulating and shut-off valve (Ref. para.3.C.) or if S.B.78-3571 incorporated, deactivate pressure regulating and shut-off valve (Ref. para.3.D.).

(6) Ensure RH lock indicator rod is underflush.

(7) Fit translating cowl in-flight locking plates (Ref. para. 3.A.).

(8) Fit pylon fairing L.H. access panel 418DL, 428DL or 438DL (Ref. 72-03-00).

(9) Prior to diagnosis and rectification of malfunction, effect applicable unlocking operations (Ref. para. 5).

CAUTION: FLEXIBLE DRIVES MUST BE DISCONNECTED FROM AIR MOTOR BEFORE AIR SUPPLY IS CONNECTED TO SYSTEM DURING RECTIFICATION AS THE AIR MOTOR AND TRANSLATING COWL COULD BE OUT OF PHASE.

FOLLOWING RECTIFICATION THE THRUST REVERSER MUST BE SET (REF. 78-30-00, ADJUSTMENT/TEST).

D. System Fails in Reverse or Mid-travel Position - Engines with S.B.78-3608 and Garrett AiResearch S.B.121186-78-1172.

Referenced Procedures:

72-03-00 Gas Generator Fairings - Removal/Installation

(1) Engines without S.B.72-3609, remove pylon fairing L.H. access panel 418DL, 428DL, or 438DL (Ref. 72-03-00).

(2) Engines with S.B.72-3609 refer to fig.202 (Sheet 2), release fasteners (1) and remove air motor brake release access panel (2).

(3) Refer to fig.201, disconnect flexible drives (1) and (2) from air motor or release air motor brake as follows:

(a) Equipment required:

C 1702211 (AiResearch 289848 Brake release adapter or 289848-1, or equivalent with 10-32 threads engines with S.B.72-3609).

(b) Refer to fig.202 (Sheet 1 or 2), insert brake release adapter through brake actuator cover and locate internally in diaphragm securing nut, hold adapter handle and screw hand nut 'A' clockwise as far as possible.

(c) Hold adapter handle, screw hand nut 'B' clockwise until hand nut slips.

NOTE: A built-in torque feature prevents over tightening of hand nut.

(4) Refer to fig.203, remove screws (1) and cover (2) from L.H. and R.H. side of firewall.

(5) Insert standard 0.25in. (6,35 mm.) squared end drive extension through either side of firewall and locate in gearbox.

(6) Connect manual cycling equipment to extension and wind in appropriate direction to position translating cowl in forward thrust. If translating cowl does not move, transfer equipment to the opposite gearbox and wind in the appropriate direction.

NOTE: Winding direction is shown on decals on firewall adjacent to winding access.

If drive is positive, position translating cowl in forward thrust position and effect operations (7) through (14).

The clearance between the forward edge of the translating cowl and the firewall should not be greater than 0.450in. (11.43mm)

If drive is not positive, effect operations in para.4A., B. or C. as applicable before effecting operations (7) through (14).

(7) Remove manual cycling equipment and extension.

(8) Lock pressure regulating and shut-off valve (Ref. para.3.C.) or if S.B.78-3571 incorporated, deactivate pressure regulating and shut-off valve (Ref. para.3.D.).

(9) Fit translating cowl in-flight lock (Ref. para.3.B.).

(10) Ensure RH lock indicator rod is underflush.

(11) Remove brake release adapter, if applicable, as follows:

(a) Refer to fig.202 (Sheet 1 or 2), hold adapter handle and screw hand nut 'B' anti-clockwise to engage air motor brake.

(b) Hold adapter handle and screw hand nut 'A' anti-clockwise to release adapter; remove adapter.

NOTE: It is not necessary to re-connect main flexible drives to gearboxes No.1 and No.6, but it is recommended that flexible drives are securely restrained to avoid damage to other components.

(12) Engines without S.B.72-3609, fit pylon fairing L.H. access panel 418DL, 428DL or 438DL (Ref.72-03-00).

(13) Engines with S.B.72-3609 refer to fig.202 (Sheet 2), fit air motor brake release access panel (2) and secure fasteners (1).

(14) Prior to diagnosis and rectification of malfunction, effect applicable unlocking operations (Ref. para.5.).

CAUTION: FLEXIBLE DRIVES MUST BE DISCONNECTED FROM AIR MOTOR BEFORE AIR SUPPLY IS CONNECTED TO SYSTEM DURING RECTIFICATION AS THE AIR MOTOR AND TRANSLATING COWL COULD BE OUT OF PHASE.

FOLLOWING RECTIFICATION THE THRUST REVERSER MUST BE SET (REF. 78-30-00, ADJUSTMENT/TEST).

3. Locking Operations

Service Bulletins referred to:

S.B.78-2168 - Locking Plate for Inoperative Thrust Reverser
S.B.78-2180 - Locking Plate for Flexible Drive Failure
S.B.78-3571 - Introduction of Pressure Regulator Remote Deactivation
S.B.78-3608 - Introduction of Detachable Cowl Lock Indicator Housing
Garrett AiResearch S.B.121186-78-1172 - Translating Cowl Gearboxes - Introduction of Locking and Manual Drive Facility
S.B.78-3793 - Introduction of Translating Cowl Gearbox Lock Bar

A. Fit Translating Cowl In-flight Locking Plates - Engines without S.B.78-3608 and Garrett AiResearch S.B. 121186-78-1172.

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

72-30-04	Support Structure
78-30-01	Thrust Reverser System In-flight Locking
78-31-17	Translating Cowl Gearbox Installation

(1) Equipment required:

LJ.18621	Locking plates - 2 off (S.B.78-2180).
CP.20309 or XUT.37595	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece

(2) Tag throttle lever, reverse thrust lever and APU/GND AIR TO REVERSER switches.

(3) Open and tag appropriate THRUST REVERSE circuit breaker on pilot's overhead circuit breaker panel CB1, zone 210.

(4) Open and tag appropriate START AIR VALVE cicuit breaker on flight engineer/second officer's aft breaker panel CB3, zone 215.

(5) Tag appropriate ENGINE START panel switchlights.

(6) Position working platform in cold stream duct.

(7) Refer to fig.204, remove L.H. and R.H. access panels (1) and ensure flexible drives are disconnected from L.H. and R.H. upper gearboxes. Tape end of flexible drives to prevent inner shaft sliding out.

(8) Remove gearbox lower securing bolts (2) from L.H. and R.H. upper gearbox mounting brackets.

(9) Insert squared key of locking plate (3) into L.H. gearbox drive; secure locking plate to mounting bracket using existing bolt (2) with washer (4) interposed between locking plate and mounting bracket.

(10) Repeat operation (9) on R.H. gearbox.

(11) Fit L.H. and R.H. access panels (1).

(12) Remove working platform.

(13) Remove tags and close circuit breakers opened in operations (2) through (5).

B. Fit Translating Cowl In-flight Lock Bars - Engines with S.B.78-3608 and Garrett AiResearch S.B.121186-78-1172.

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

71-30-01 Engine Firewall
78-30-01 Thrust Reverser In-flight Locking

(1) Equipment required:

LJ.23989 Lock bar - 2 off (S.B.78-3793)

(2) Deactivate thrust reverser and associated systems as detailed in para.3.A.(2) through (5).

(3) Refer to fig.203, remove screws (1) and cover (2) from L.H. and R.H. side of firewall.

(4) Insert lock bar (3) through L.H. side of firewall and locate in L.H. gearbox. Secure lock bar with existing screws (1).

(5) Repeat operation (4) on R.H. gearbox.

(6) Remove tags and close circuit breakers opened in operation (2).

C. Lock Pressure Regulating and Shut-off Valve - Engines without S.B.78-3571 or engines with S.B.78-3571 with reverser pressure indicating light 'ON'.

Referenced Procedures:

72-03-00 Gas Generator Fairings - Removal/Installation

(1) Equipment required:

CP.20309 or XUT.37594	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece
246526	5/32in. (3,9 mm.) hexagon wrench key (Allen key)

(2) Deactivate thrust reverser and associated systems as detailed in para.3.A. (2) through (5).

(3) Position working platform in cold stream duct.

(4) Enter cold stream duct and remove L.H. front access panel from interservices fairing (Ref. 72-03-00).

(5) CAUTION: ENSURE ELECTRICAL CONNECTOR IS FREE FROM LIQUID AND/OR SOLID CONTAMINATION BEFORE DISCONNECTING. FAILURE TO DO SO COULD RESULT IN A FIRE.
Refer to fig.206., disconnect electrical connector from valve. Fit approved blanks and temporarily secure harness in interservices fairing.

(6) Remove screws (detail 'A') securing valve cover plate.

(7) Reverse cover plate (detail 'B') and position on valve ensuring slot in boss (detail 'A') engages butterfly valve shaft. Secure cover plate with screws to lock valve in closed position.

NOTE: If cover plate screw holes do not align with valve screw holes, insert hexagon wrench key into recess (detail 'B') and turn clockwise to close butterfly valve. Secure cover plate with screws to lock valve in closed position.

(8) Fit L.H. front access panel to interservices fairing (Ref. 72-03-00).

(9) Remove working platform from cold stream duct.

(10) Remove tags and close circuit breakers opened in operation (2).

(11) If valve is defective, replace (Ref. 78-31-02, Maintenance Practices) at earliest opportunity.

D. Deactivate Pressure Regulating and Shut-off Valve - Engines with S.B.78-3571.

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

72-03-04 Pylon Fairing - Turbine Section
78-30-01 Thrust Reverser In-flight Locking

(1) Equipment required:

LK59616 Cover-Deactivation key (S.B.78-3571)

(2) Deactivate thrust reverser and associated system as detailed in para.3.A.(2) through (5).

(3) Refer to fig.205, remove screws (1) from pylon fairing.

(4) Position cover (2) with key located, through hole in fairing, into deactivation valve and secure cover (2) to fairing with screws (1).

(5) Remove tags and close circuit breakers opened in operation (2).

4. Manual Cycle Translating Cowl to Forward Thrust

Three methods are detailed for manually cycling the translating cowl depending on the position of the translating cowl. They are:

Method 1 - Translating cowl in reverse thrust (See para.A.)

Method 2 - Translating cowl between reverse thrust and mid-travel position (See para.B.)

Method 3 - Translating cowl between mid-travel and forward thrust position (See para.C.)

Referenced Procedures:

72-03-00 Gas Generator Fairing - Removal/Installation
78-31-20 Deflector Vane - Removal/Installation

A. Method 1 - Translating Cowl in Reverse Thrust

(1) Equipment required:

289200 or C 4G 4342	Protective work mats
CP.20309 or XUT.37594	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece
1703094 (Snap-On 1209556)	Extension 6in.
1703095 (Snap-On 1209557)	Extension 12in.
1702201 (Snap-On KF.4)	Speed handle
1700046 (Snap-On KFU.80)	Universal drive
HU.20163/1	Socket spanner

(2) Tag throttle lever, reverse thrust lever and APU/GND AIR TO REVERSER switches.

(3) Open and tag appropriate THRUST REVERSE circuit breaker on pilot's overhead circuit breaker panel CB1, zone 210.

(4) Open and tag appropriate START AIR VALVE circuit breaker on flight engineer/second officer's aft breaker panel CB3, zone 215.

(5) Tag appropriate ENGINE START panel switchlights.

(6) Remove a lower, wide deflector box assembly (Ref. 78-31-20).

(7) Position work mats in cold stream duct.

(8) CAUTION: CARE MUST BE TAKEN WHEN SELECTING FOOTHOLDS TO AVOID DAMAGING STRUCTURES.
Refer to Fig.204, remove L.H. and R.H. access panels (1) from acoustic fairing support structure (Ref. 72-03-00).

(9) Using socket spanner, disconnect flexible drive from translating cowl L.H. and R.H. gearbox. Tape end of flexible drive to prevent inner shaft from sliding out.

(10) Fit lower, wide deflector box assembly (Ref. 78-31-20).

NOTE: The personnel operating the manual cycling equipment remain in the cold stream duct after the deflector box has been fitted.

(11) WARNING: ENSURE CARE IS EXERCISED IN THE POSITIONING OF PERSONNEL, EQUIPMENT AND TOOLS DURING MANUAL CYCLING.
Attach suitable adapter to either gearbox drive. Using universal drive, extension(s) and speed handle, wind in appropriate direction (L.H. gearbox anti-clockwise, R.H. gearbox clockwise) to position translating cowl in forward thrust position. Remove manual cycling equipment.

(12) Remove protective work mats and position working platform in cold stream duct.

NOTE: If applicable, fit translating cowl locking plates (Ref. para.3.A. (5) through (7)).

(13) Fit L.H. and R.H. access panels (1) to acoustic fairing support structure.

(14) Remove working platform from cold stream duct.

(15) Remove tags and close circuit breakers opened in Operations (2) through (5).

B. Method 2 - Translating Cowl between Reverse Thrust and Mid-travel Position

(1) Equipment required:

289200 or C 4G 4342	Protective work mats
CP.20309 or XUT.37594	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece
1703094 (Snap-On 1209556)	Extension 6in.
1703095 (Snap-On 1209557)	Extension 12in.
1702201 (Snap-On KF.4)	Speed handle
1700046 (Snap-On KFU.80)	Universal drive
HU.20163/1	Socket spanner

(2) Deactivate thrust reverser and associated systems as detailed in para.4.A. (2) through (5).

R (3) Refer to fig.207; remove lower translating cowl panel

(4) Remove bolts (2) and (3) securing lower blocker flap finger bracket (4).

NOTE: On some standards of engines the packing piece (5) is not secured to the translating cowl support ring and must be retained for subsequent installation of the blocker flap.

(5) Push lower blocker flap forward to gain entry to cold stream duct.

(6) Position work mats in cold stream duct

(7) CAUTION: CARE MUST BE TAKEN WHEN SELECTING FOOTHOLDS TO AVOID DAMAGING STRUCTURES.
Refer to fig.204, remove L.H. and R.H. access panels (1) from acoustic fairing support structure.

(8) Using socket spanner, disconnect flexible drive from translating cowl, L.H. and R.H. gearbox. Tape end of flexible drive to prevent inner shaft from sliding out.

(9) Refer to fig.207, position finger bracket (4) on translating cowl, interposing packing piece (5) between finger bracket and cowl, if not secured to support ring. Secure with bolts (2) and (3).

NOTE: Personnel operating the manual cycling equipment remain in the cold stream duct.

(10) Fit translating cowl lower panel (1).

(11) WARNING: ENSURE CARE IS EXERCISED IN THE POSITIONING OF PERSONNEL, EQUIPMENT AND TOOLS DURING MANUAL CYCLING.
Attach suitable adapter to either gearbox drive. Using universal drive, extension(s) and speed handle wind in appropriate direction (L.H. gearbox anti-clockwise; R.H. gearbox clockwise) to position translating cowl in forward thrust position. Remove manual cycling equipment.

(12) Remove protective work mats and position working platform in cold stream duct.

NOTE: If applicable, fit translating cowl locking
R plates (Ref. para. 3.A.(8) through (11)).

(13) Refer to fig.204, fit L.H. and R.H. access panels (1) to acoustic fairing support structure.

(14) Remove working platform from cold stream duct.

(15) Remove tags and close circuit breakers opened in operation (2).

C. Method 3 - Translating Cowl between Mid-travel and Forward Thrust Position

(1) Equipment required:

289200 or C 4G 4342	Protective work mats
CP.20309 or XUT.37594	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece
1703094 (Snap-On 1209556)	Extension 6in.
1703095 (Snap-On 1209557)	Extension 12in.
1702201 (Snap-On KF.4)	Speed handle
1700046 (Snap-On KFU.80)	Universal drive
HU.20163/1	Socket spanner

(2) Deactivate thrust reverser and associated systems as detailed in para.4.A. (2) through (5).

(3) Position work mats over blocker doors and enter cold stream duct through gap between blocker doors and gas generator fairings.

(4) Position work mats in cold stream duct.

(5) CAUTION: CARE MUST BE TAKEN WHEN SELECTING FOOTHOLDS TO AVOID DAMAGING STRUCTURES.
Refer to fig.204, remove L.H. and R.H. access panels (1) from acoustic fairing support structure.

(6) Using socket spanner disconnect flexible drive from translating cowl L.H. and R.H. gearbox. Tape end of flexible drive to prevent inner shaft from sliding out.

(7) WARNING: ENSURE CARE IS EXERCISED IN THE POSITIONING OF PERSONNEL, EQUIPMENT AND TOOLS DURING MANUAL CYCLING.
Attach suitable adapter to either gearbox drive. Using universal drive, extension(s) and speed handle, wind in appropriate direction (L.H. gearbox anti-clockwise, R.H. gearbox clockwise) to position translating cowl in forward thrust position. Remove manual cycling equipment.

(8) Remove protective work mats and position working platform in cold stream duct.

R NOTE: If applicable, fit translating cowl locking plates (Ref. para.3.A. (8) through (11)).

(9) Fit L.H. and R.H. access panels (1) to acoustic fairing support structure.

(10) Remove working platform from cold stream duct.

(11) Remove tags and close circuit breakers opened in operation (2).

5. Unlocking Operations

Service Bulletins referred to:

S.B.78-3571 - Introduction of Pressure Regulator Remote Deactivation
S.B.78-3608 - Introduction of Detachable Cowl Lock Indicator Housing
Garrett AiResearch S.B.1121186-78-1172 - Translating Cowl Gearboxes - Introduction of Locking and Manual Drive Facility.

A. Remove Translating Cowl Locking Plate - Engines without S.B.78-3608 and Garrett AiResearch S.B.121186-78-1172

Referenced Procedures:

78-30-00 Thrust Reverser - Adjustment/Test
78-31-08 Translating Cowl Flexible Drives - Maintenance/ Practices

(1) Equipment required:

CP.20309 or XUT.37594	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece
HU.20163/1	Socket spanner

(2) Deactivate and tag thrust reverser and associated systems as detailed in para.3.A.(2) through (5). R

(3) Position working platform in cold stream duct.

(4) Refer to fig.204, enter cold stream duct and remove L.H. and R.H. access panels (1).

(5) Remove bolt (2), locking assembly (3), (LJ.18621) and washer (4) from translating cowl L.H. and R.H. upper gearboxes. Fit and secure bolt (2) and washer (4).

(6) Replace defective flexible drives (Ref. 78-31-08) and set cold stream reverser (Ref. 78-30-00).

(7) Fit L.H. and R.H. access panels (1).

(8) Remove working platform from cold stream duct.

(9) Remove tags and close circuit breakers opened in operation (2).

B. Remove Translating Cowl In-flight Lock Bars - Engines with S.B.78-3608 and Garrett AiResearch S.B.121186-78-1172.

R (1) Open circuit breakers and tag system as detailed in operations 3.A. (2) through (5).

(2) Refer to fig.203, remove screws (1) securing L.H. and R.H. lock bars (3).

(3) Remove lock bars (3) from L.H. and R.H. gearboxes.

(4) Fit covers (2) to L.H. and R.H. side of firewall and secure with screws (1).

(5) Remove tags and close circuit breakers opened in operation (1).

C. Unlock Pressure Regulating and Shut-off Valve - Engines without S.B.78-3571

Referenced Procedures:

72-03-00 Gas Generator Fairings - Removal/Installation

(1) Equipment required:

CP.20309 or XUT.37594	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece

R (2) Deactivate and tag thrust reverser and associated system as detailed in para.3.A. (2) through (5).

(3) Position working platform in cold stream duct.

(4) Enter cold stream duct and remove L.H. front access panel (Ref. 72-03-00).

(5) Refer to fig.206, remove screws from cover plate; reverse cover plate with slotted boss outward, detail 'A', position plate on valve. Fit and secure screws.

(6) CAUTION: ENSURE ELECTRICAL CONNECTOR IS FREE FROM LIQUID AND/OR SOLID CONTAMINATION BEFORE RECONNECTING. FAILURE TO DO SO COULD RESULT IN A FIRE.
Remove blanks and connect electrical connector to valve.

(7) Fit L.H. front access panel to interservices fairing (Ref. 72-03-00).

(8) Remove working platform from cold stream duct.

(9) Remove tags and close circuit breakers opened in operation (2).

D. Reactivate Pressure Regulating and Shut-off Valve - Engines with S.B.78-3571

(1) Open circuit breakers and tag systems as detailed in
R operations 3. A. (2) through (5).

(2) Refer to fig.205, remove screws (1) and remove cover (2).

(3) Refit screws (1) to fairing.

(4) Remove tags and close circuit breakers opened in operation (1).

R NOTE: Check pressure regulating and shut-off valve to
R determine if it is locked, (Ref. fig.206 detail
R 'B'). If so, reactivate P.R.S.O.V. (Ref.
R para.5.C.).

R 6. Configuration Deviation

R The appropriate airworthiness authority approved Configuration
R Deviation List (CDL) and Master Minimum Equipment List (MMEL)
R define which thrust reverser components may be removed or missing
R for continued engine operation. Reference must be made to these
R documents to confirm the description and quantity of items which
R may be removed and any associated operating limitations.

R Further guidance on thrust reverser configuration deviation
R operating procedures is provided in the Lockheed MMEL Procedures
R Manual, but the CDL, the MMEL and the individual operators Minimum
R Equipment List (MEL) must be used to determine operating
R limitations.

R The following procedures describe how to remove a thrust reverser
R blocker flap or translating cowl screwjack for continued operation
R in accordance with the CDL or MMEL.

R A. Remove Blocker Flap

R Refer to the CDL or MMEL to determine the requirement for
R further action and any operating limitation following blocker
R flap removal.

R (1) Remove blocker flap as detailed in 78-31-16 Maintenance
R Practices.

R (2) Refit deflector vanes (Ref.78-31-20 Maintenance
R Practices) removed for access.

R (3) Refit acoustic tray removed for access.

R (4) Refit translating cowl panel removed for access.

R (5) Unlock and reactivate thrust reverser and associated
R systems (Ref.78-30-00 Servicing).

R (6) Operate thrust reverser to forward thrust position
R (Ref.78-30-00 Adjustment test).

R B. Translating Cowl Screwjack Removal

R Translating cowl screwjack removal will be necessary in the
R event of a condition where the screwjack has seized and the
R thrust reverser stowed condition cannot be achieved.

R Only one screwjack may be removed at the No.3 (lower R.H.)
R or No.4 (lower L.H.) positions as defined in the CDL and
R MMEL. The associated gearbox and flexible driveshafts may
R also be removed if necessary.

R (1) Manually traverse the thrust reverser to the reverse
R thrust position (Ref.78-31-07 Maintenance Practices).

R (2) Remove the translating cowl screwjack connected to
R lower R.H. (No.3) or L.H. (No.4) gearbox as detailed
R in 78-31-19 Maintenance Practices.

R (3) If necessary remove associated gearbox and flexible
R driveshafts. If the flexible driveshafts have not
R seized it is acceptable to remove just the inner
R driveshafts (Ref.78-31-09 Removal/Installation).

R (a) Remove lower R.H. (No.3) or L.H. (No.4) gearbox

R (b) Equipment Required

R HU20163/1 Socket spanner

R (c) Refer to Fig.208 using socket spanner, disconnect
R connectors (1) and (2).

R (d) Remove bolts and washers (4) and remove gearbox (3).

R (e) Remove appropriate flexible drives to the
R removed gearbox as detailed in 78-31-09
R Removal/Installation.

R (4) On engines not incorporating S.B.78-3875, install
R firewall and pressure cylinder assembly (Ref.71-30-01).

R (5) On engines incorporating S.B.78-3875, install lower
R fixed firewall and pressure cylinder assembly
R (Ref.71-30-01).

R (6) No.1 and No.3 engines

R (a) Fit L.H. and R.H hinged cowls, 413A or 423A
R (Ref.71-11-01) and 414A or 424A (Ref.71-11-02).

R (7) No.2 engine

R (a) Fit L.H. and R.H. upper hinged cowls, 433DL and
R 434DR (Ref.71-12-05).

R (b) Fit L.H. and R.H. lower hinged cowls, 433AL and
R 434AR (Ref.71-12-01).

R (c) Fit L.H. and R.H. mid fixed cowls, 433CL and
R 434CR (Ref.71-12-03).

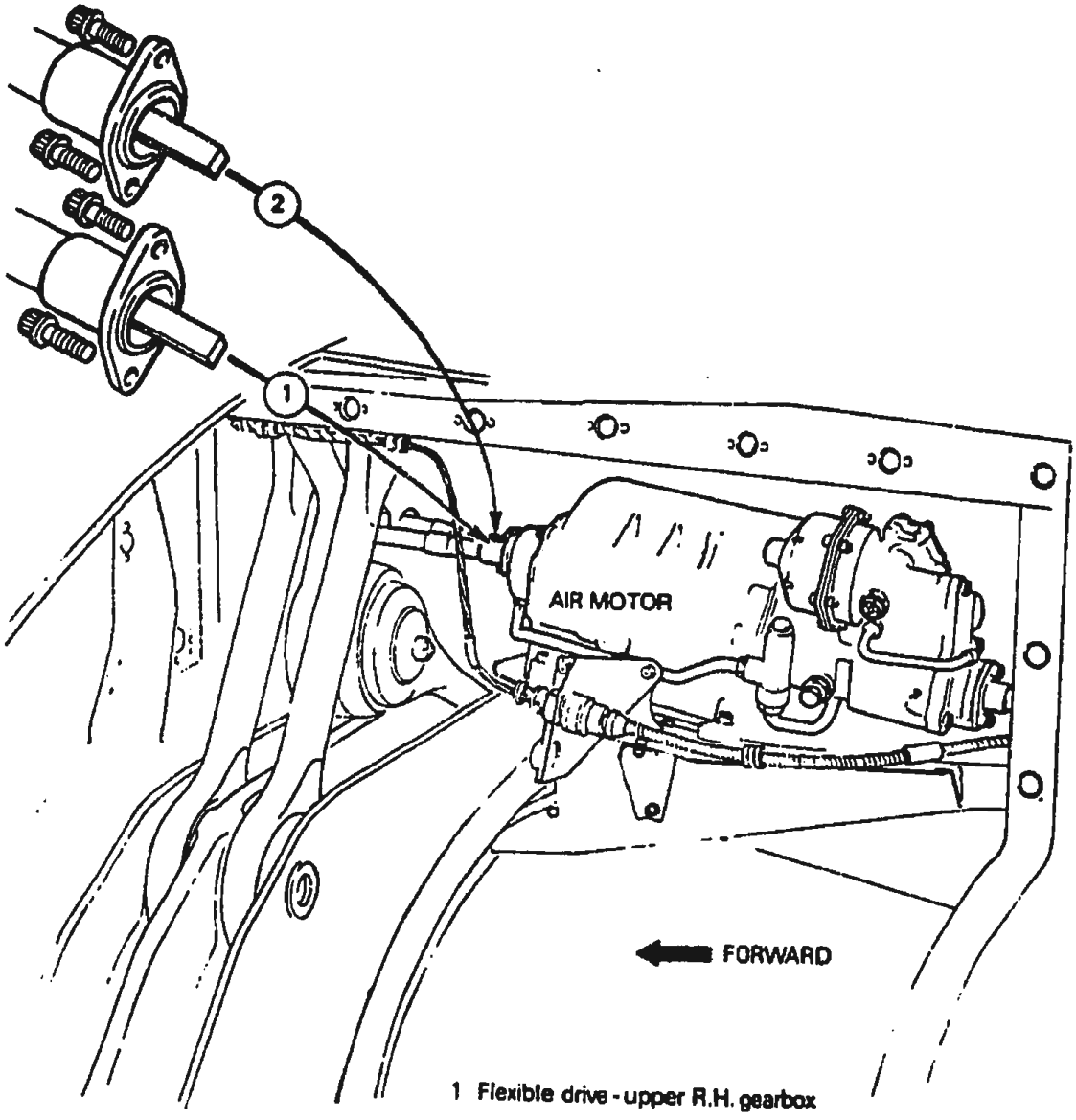
R (8) Manually traverse the thrust reverser to the forward
R thrust position (Ref.78-31-07 Maintenance Practices).

R (9) Inspect to ensure that all remaining mechanical drive
R housings are secured to the translating cowl.

R (10) Fit translating cowl L.H. and R.H. and bottom panel
R assemblies and secure fasteners (Ref.78-31-07
R Maintenance Practices).

R (11) Perform In Flight locking procedure (Ref. Para.3).

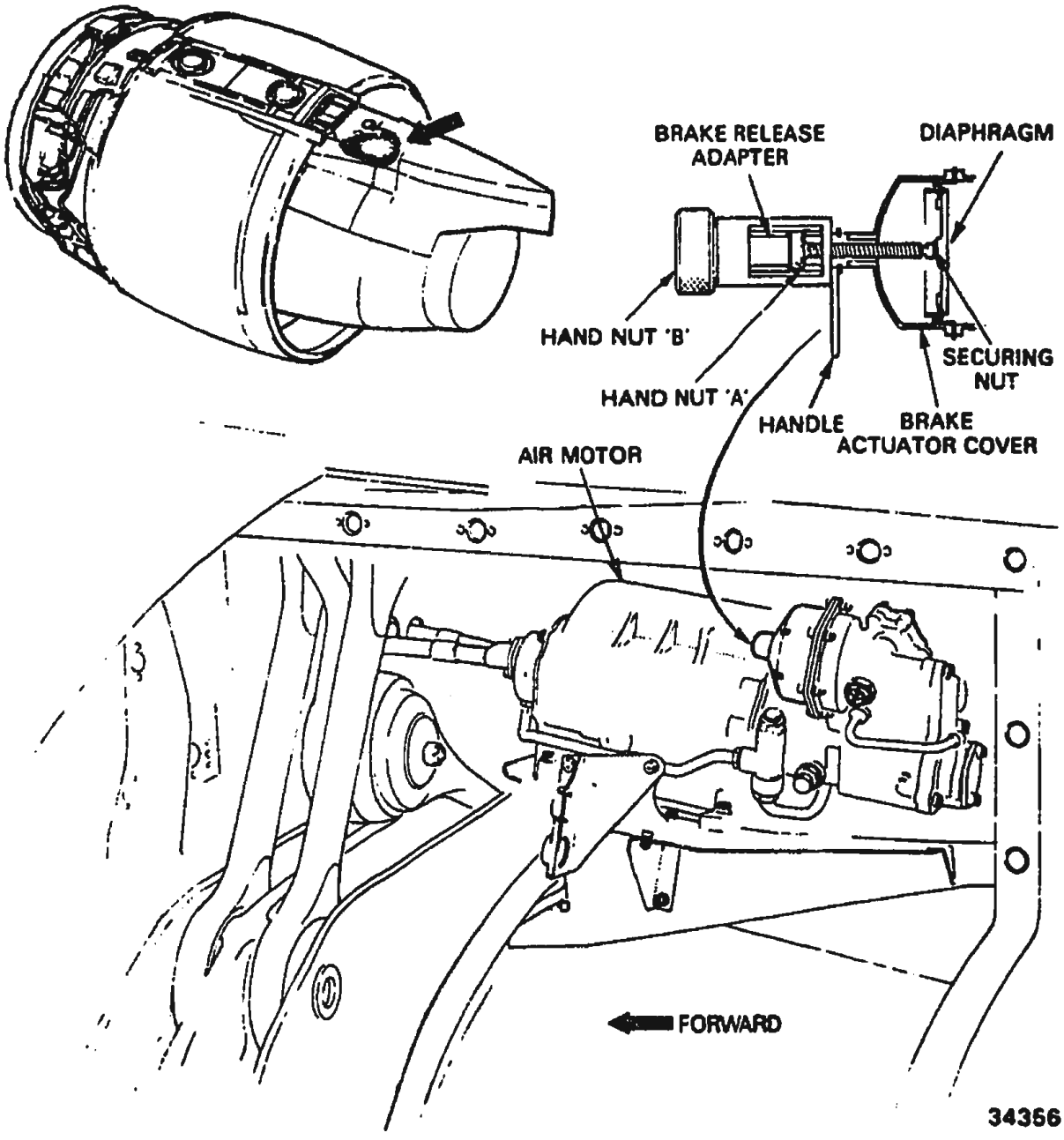
R (12) Refer to the CDL and MMEL to determine requirement
R for further action and any operating limitations.



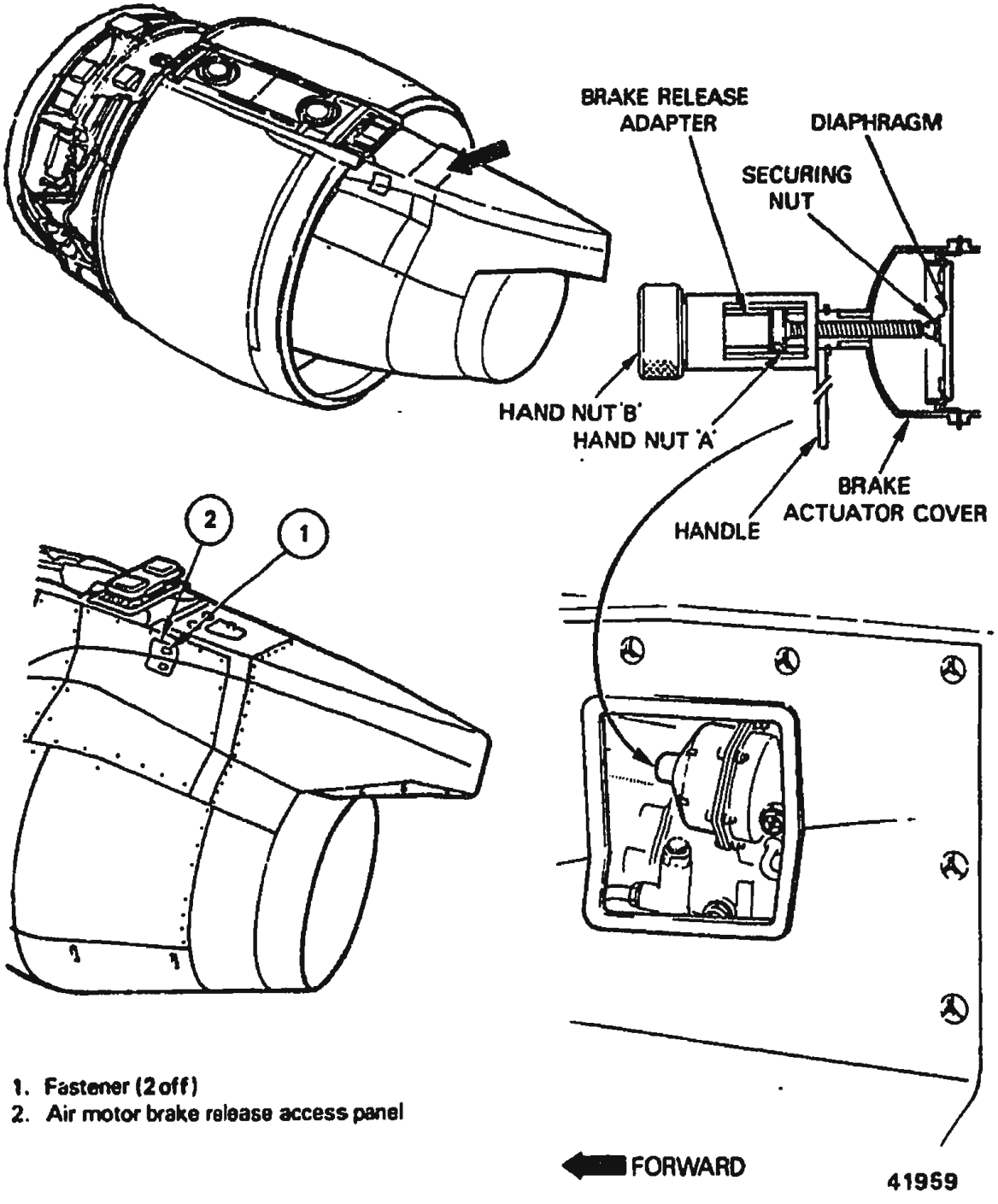
1 Flexible drive - upper R.H. gearbox
2. Flexible drive - upper L.H. gearbox

32525

Flexible drives disconnect points
Fig.201

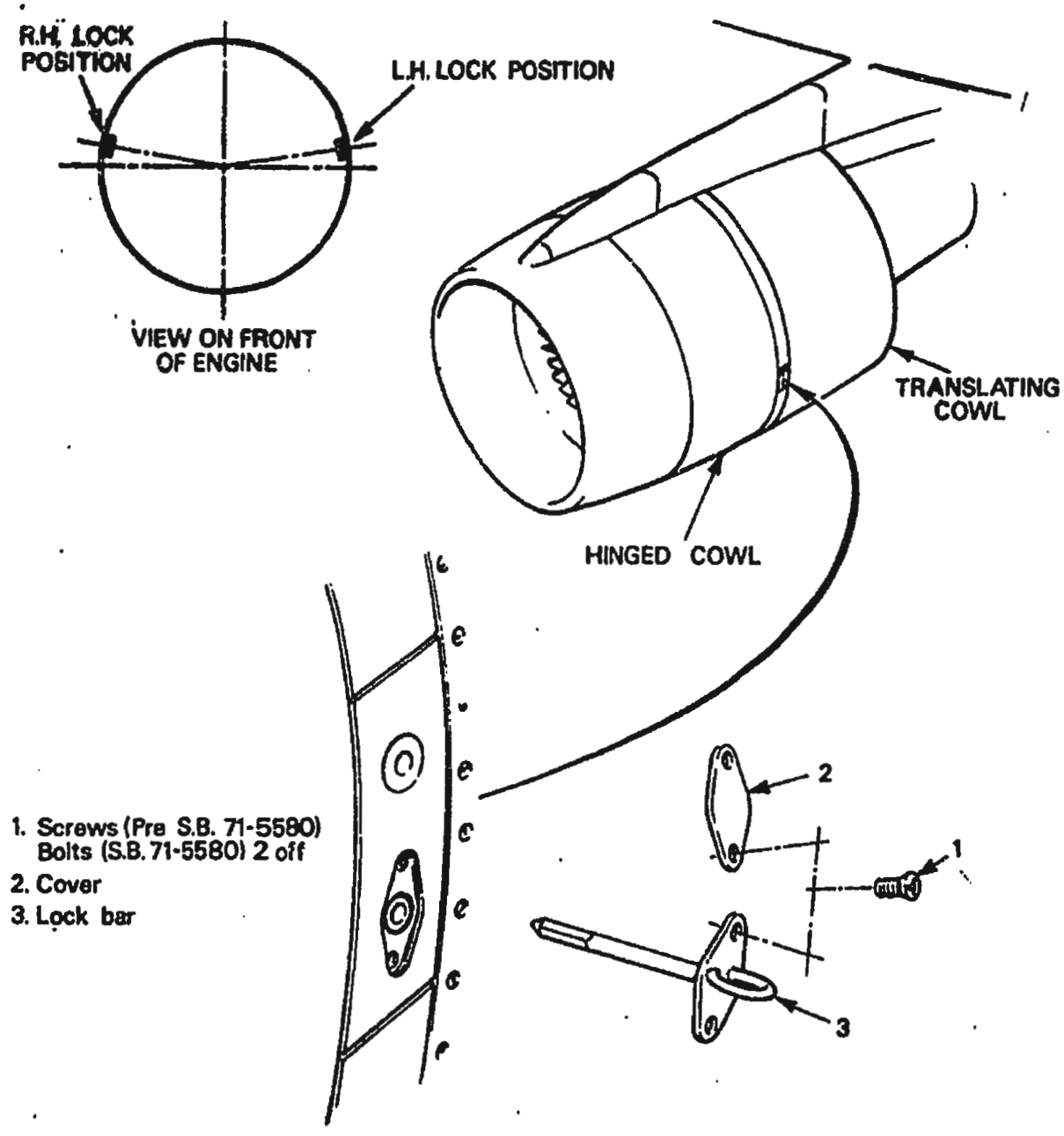


Air motor brake release access
(Engines without S.B.72-3609)
Fig.202 (Sheet 1)



1. Fastener (2 off)
2. Air motor brake release access panel

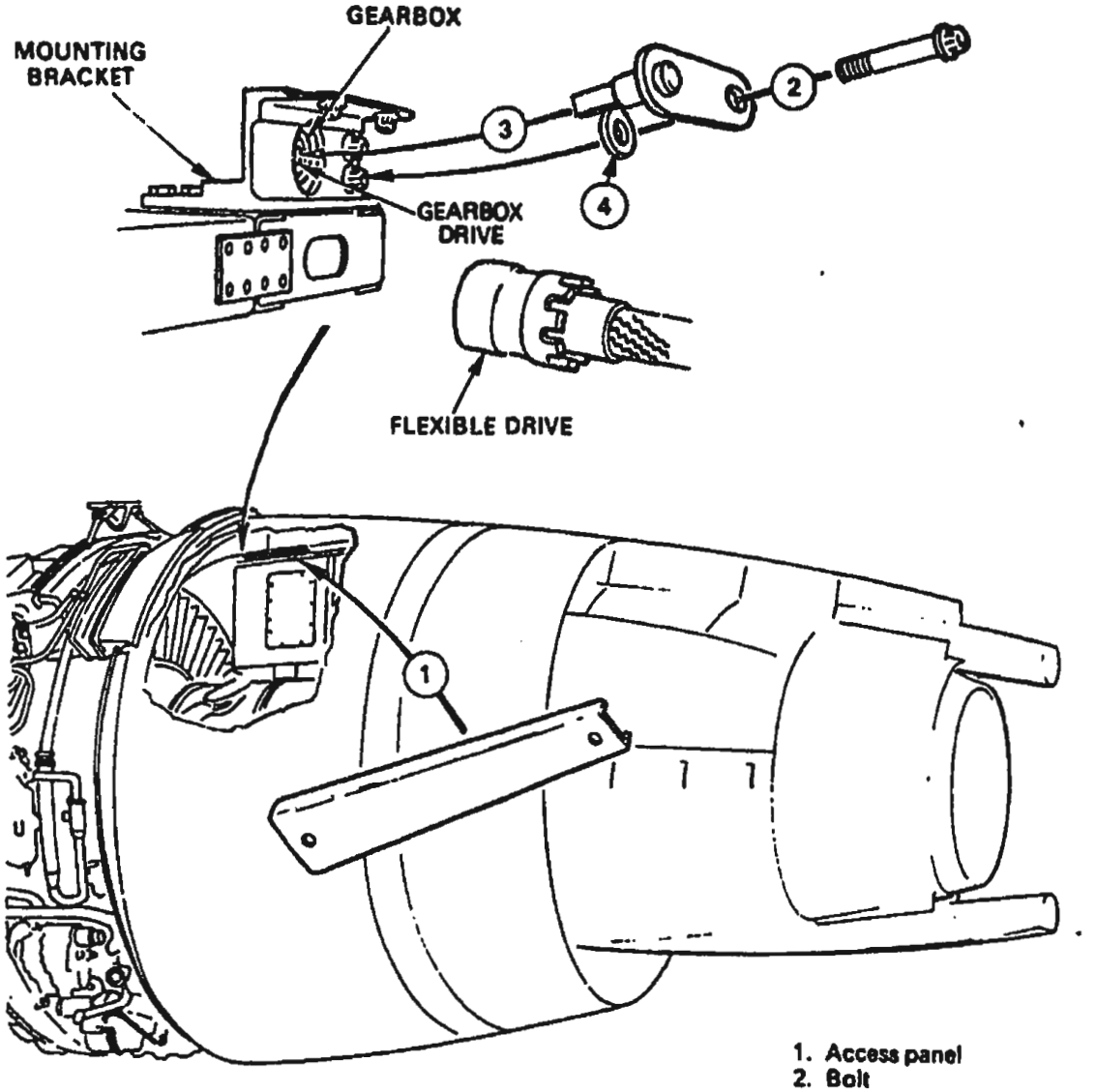
Air motor brake release access (Engines with S.B.72-3609)
Fig.202 (Sheet 2)



Wing engine shown, fuselage engine lock positions are located between mid fixed panels and translating cowl.

32526A

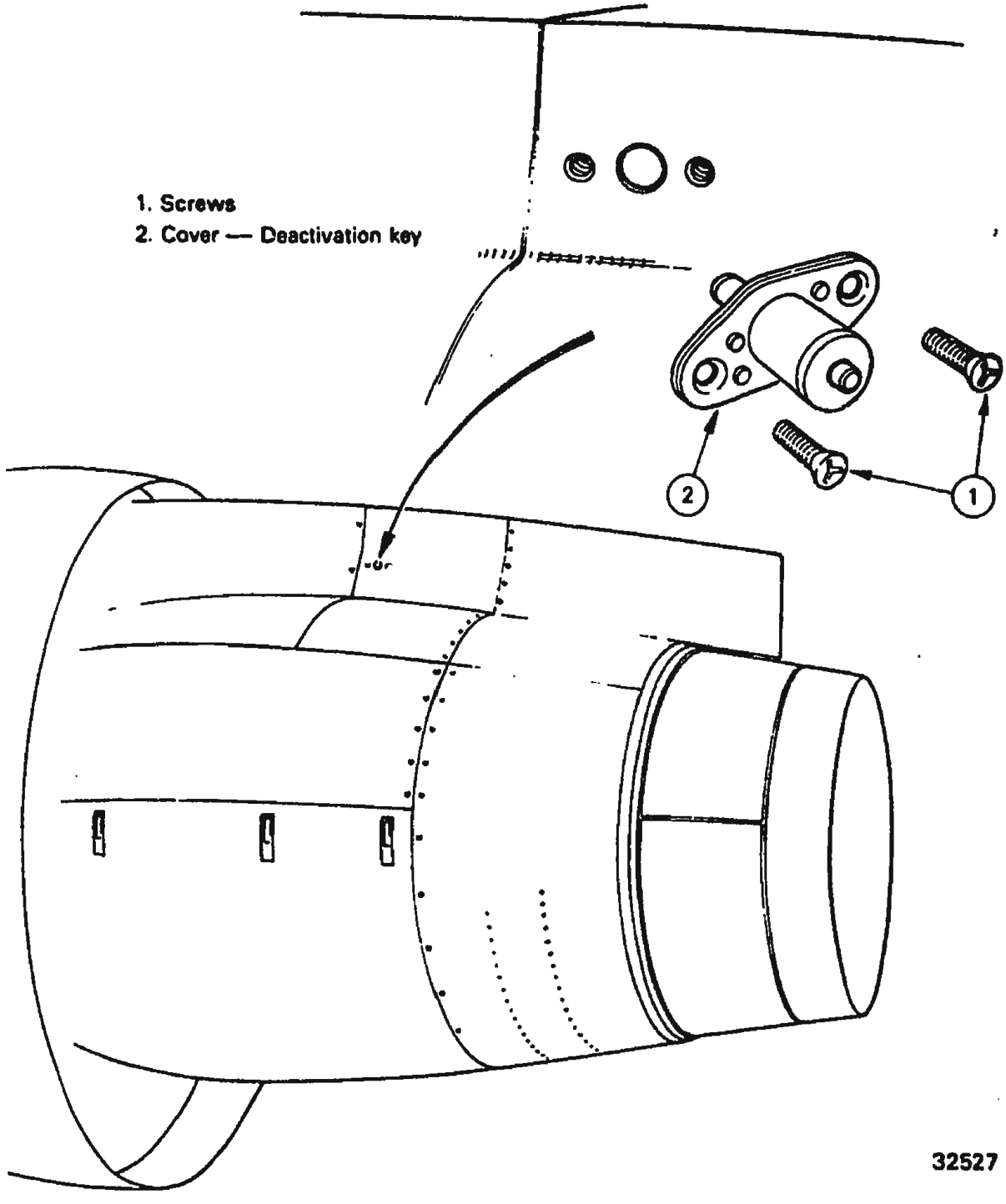
Translating cowl locking (Engines with S.B.78-3608)
Fig.203



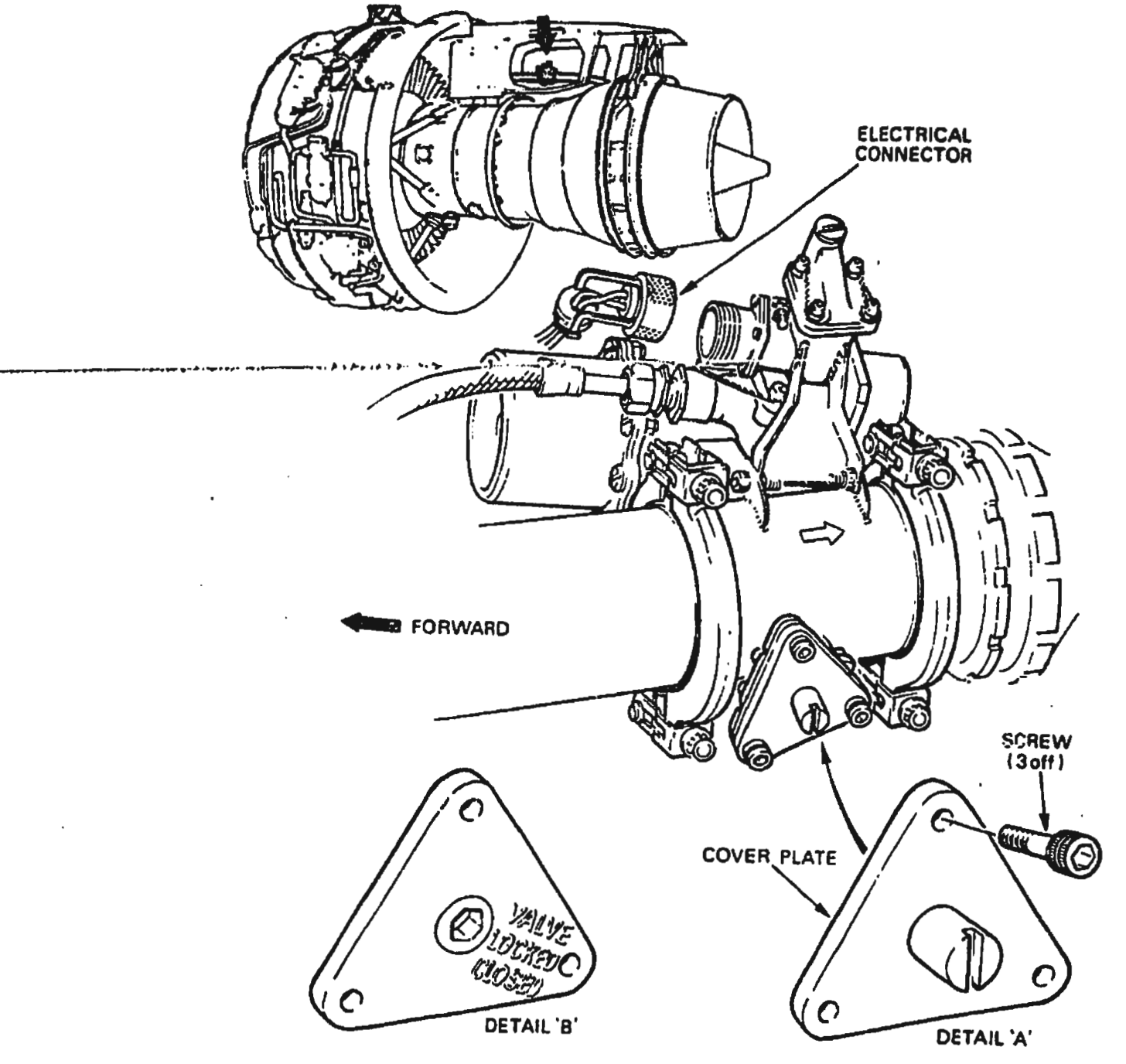
1. Access panel
2. Bolt
3. Locking assembly (2 off)
4. Washer

26773

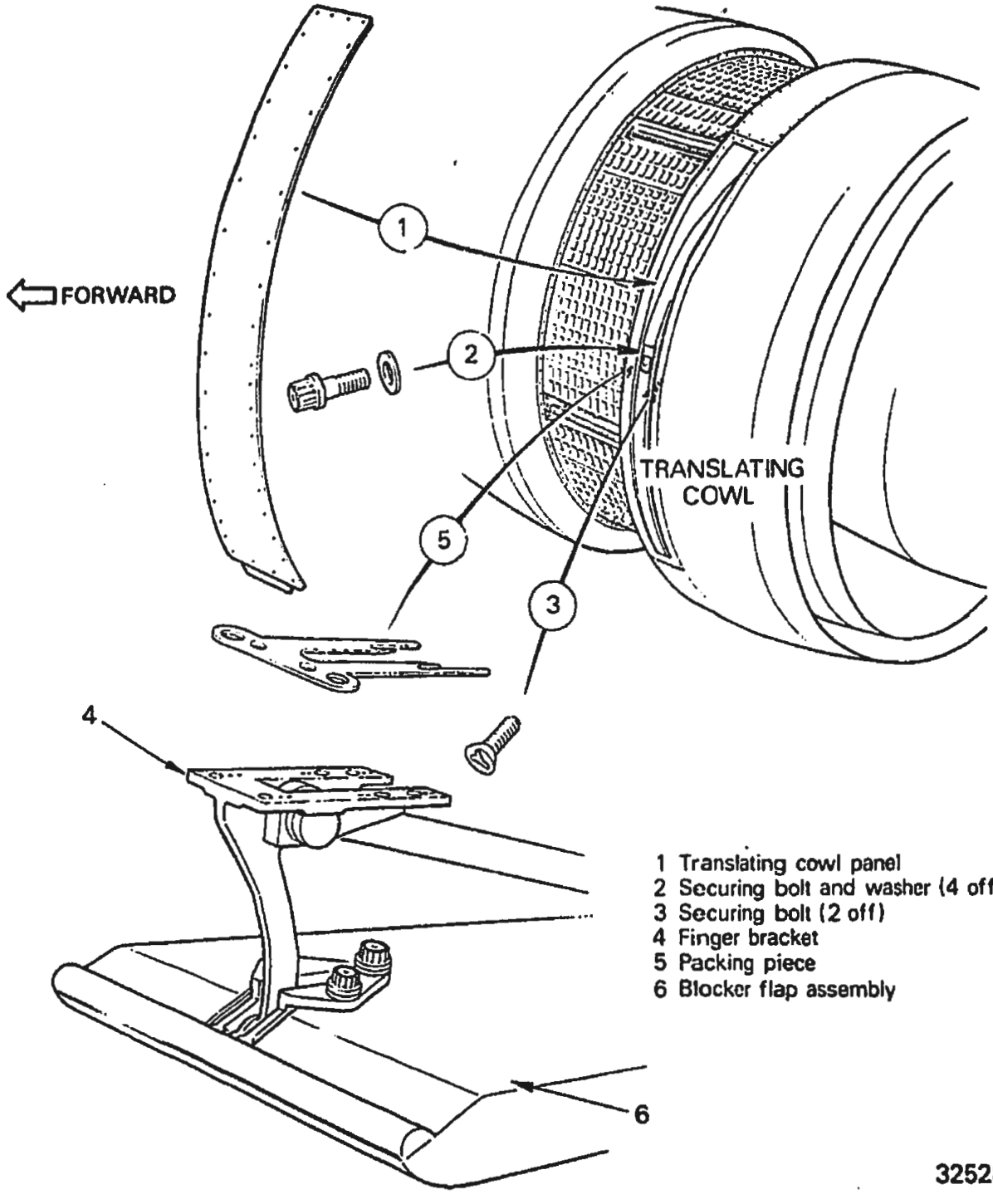
Translating cowl locking plate installation
Fig.204



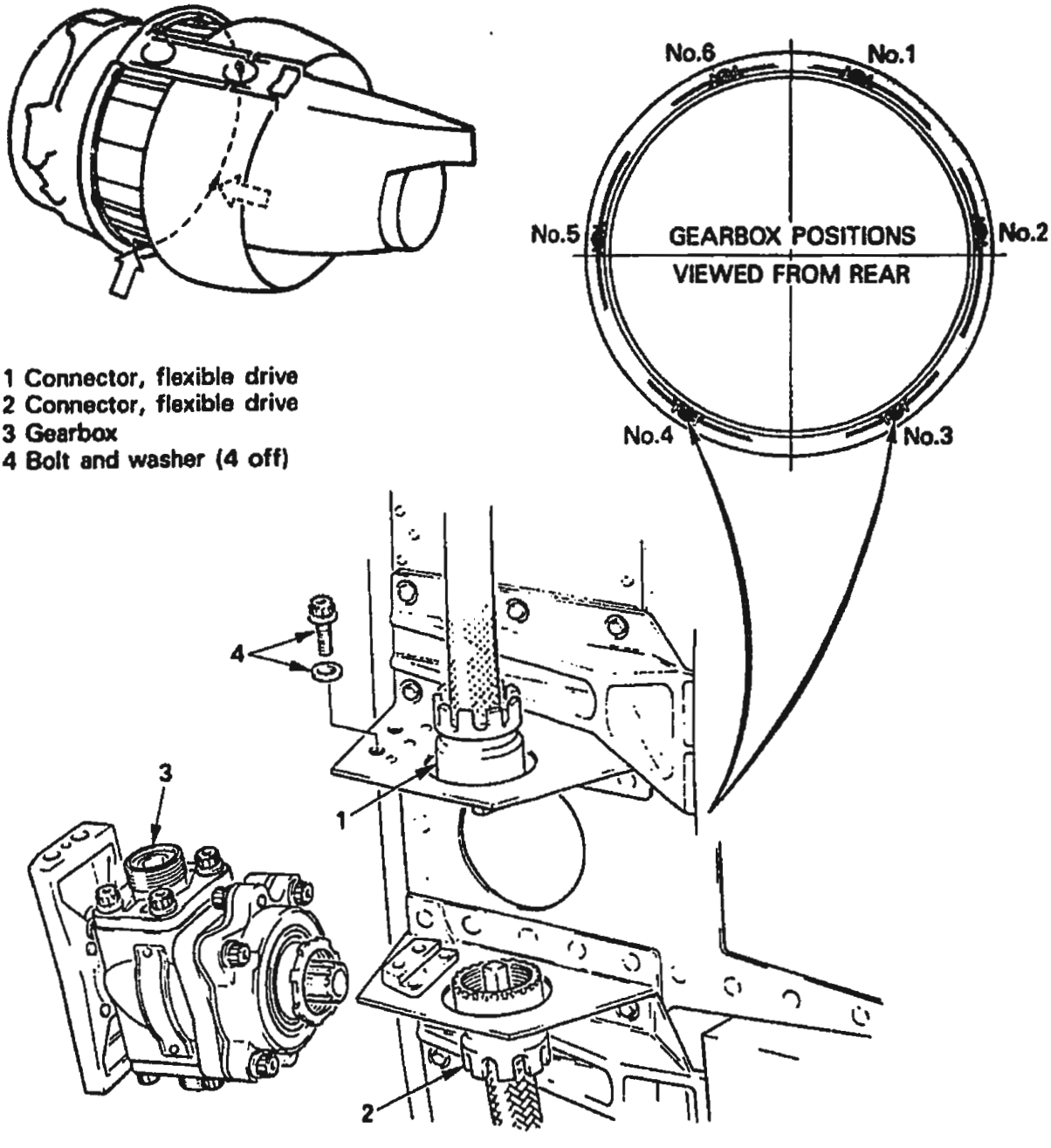
Pressure regulating and shut-off valve deactivation
(Engines with S.B.78-3571)
Fig.205



Lock pressure regulating and shut-off valve
Fig.206



Blocker flaps disconnect points
Fig.207



Translating Cowl Gearbox - Removal
Fig.208

COLD STREAM THRUST REVERSER SYSTEM - INSPECTION/CHECK

1. Inspection/Check

WARNING: ENSURE THRUST REVERSER SYSTEM IS ALWAYS LOCKED IN THE REQUIRED POSITION (78-30-00, SERVICING) WHILE WORK IS IN PROGRESS.

A. Inspect Cold Stream Reverser

(1) Equipment required

CP.20309	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece

(2) Manually translate thrust reverser system to reverse thrust position (Ref. 78-30-00, Adjustment/Test).

(3) Tag throttle levers, reverse thrust levers and APU/GND AIR REVERSER switches.

R (4) Open and tag appropriate THRUST REVERSE circuit breaker on pilot's overhead circuit breaker panel CB1, zone 210.

(5) Open and tag appropriate START AIR VALVE circuit breaker on flight engineer/second officers aft circuit breaker panel CB3, zone 215.

(6) Tag appropriate ENGINE START panel switchlights.

(7) Remove sufficient deflector box assemblies (Ref. 78-31-20) from each side to gain access to blocker flaps and reverser case.

(8) Inspect reverser case and translating cowl for cracks, distortion, indentations, scores and abrasions.

(9) Inspect all existing cracks, previously stop drilled, to ensure further cracking has not occurred.

(10) Remove translating cowl panels and inspect translating cowl inner skin, where possible, for cracks.

(11) Inspect panel stiffeners, where possible, for distortion.

(12) Inspect deflector box assemblies and swivel flaps for cracks and scores. Inspect swivel flap spring assemblies and ensure flaps move freely.

(13) Inspect blocker flaps and finger brackets, where possible, for cracks.

R (14) Inspect acoustic panels (Ref.Fig.603) for cracks, scores,
R indentations and for missing panels.

(15) Inspect translating cowl forward pressure seal for damage.

(16) Inspect screwjacks and mechanical drive housings for cracks, scores and security of attachment.

(17) Inspect sealing strips for cracks.

(18) Inspect reverser mounted translating cowl lock mechanism for damage and security and inspect crush tubes for bowing, kinking and security.

(19) Inspect crush tube bolts for distortion and stretching.

(20) Fit deflector box assemblies (Ref. 78-31-20) removed in operation (7).

(21) Remove tags and close appropriate THRUST REVERSE circuit breaker opened in operation (4).

(22) Remove tags from reverse thrust lever and APU/GND AIR REVERSER switch.

(23) Manually translate thrust reverser to forward thrust position (Ref. 78-30-00, Adjustment/Test).

(24) Tag reverse thrust lever and APU/GND AIR REVERSER switches.

(25) R Open and tag appropriate THRUST REVERSE circuit breaker on pilot's overhead circuit breaker panel CB1, zone 210.

(26) Inspect cold stream nozzle for cracks, distortion, indentations, scores, abrasions and acoustic lining for damage.

(27) Position working platform in cold stream duct.

(28) Inspect gearbox bearing retainers for protrusion (Ref. 78-31-17).

(29) Enter cold stream duct and remove the following interservices fairing L.H. and R.H. access panels (Ref. 72-03-00) to gain access to flexible drives:

Nose section
Front access panel
Rear access panel
Pylon fairing access panel

(30) Inspect air motor to translating cowl flexible drive outer casings for bulging, fraying and signs of overheating.

(31) Fit interservices fairing access panels removed in operation (25).

(32) Remove working platform from cold stream duct.

(33) Remove tags and close circuit breakers opened in operation (3) through (6).

B. Acceptance Standards

(1) Cracks

(a) Cracks emanating from an outer edge are not acceptable. Cracks are not acceptable in the following areas:

Translating cowl inner skin
Single skin exit area at cold stream nozzle
Deflector box longerons
Finger brackets
Reverser case
Blocker flap body
Screwjack
Mechanical drive housing

(b) Cracks in translating cowl, deflector vanes, swivel flaps and cold stream nozzle except areas referred to in (a), are acceptable up to 1.00in. (25,4 mm.), if stop drilled at crack extremities with a 0.1875in. (4,76 mm.) diameter drill.

(c) Cracks in acoustic panels are acceptable up to 0.50in. (12,7 mm.). Damage in excess of these limits, repair in accordance with FRS3440 (Ref.78-31-00, Approved Repairs).

(d) Cracks in sealing strips (Fig.602, dimension 'A') are acceptable up to 1.50in. (38,1 mm.) if stop drilled at crack extremities in accordance with FRS.3255 (Ref.70-42-26, Standard Practices).

(2) Indentations

(a) Smooth dents in translating cowl and cold stream nozzle are acceptable to a depth of 0.25in. (6,4 mm.), over an area not exceeding 4.00in. (101,6 mm.) diameter, provided a minimum of 4.00in. (101,6 mm.) exists between areas of damage and movement of translating cowl is not impeded.

(b) Smooth dents in reverser case are acceptable to a depth 0.15in. (3,1 mm.), over an area not exceeding 2,00in. (50,8 mm.) diameter, provided a minimum of 4.00in. (101,6 mm.) exists between areas of damage.

(c) Smooth dents in acoustic panels are acceptable to a depth of 0.15in. (3,1 mm.), over an area not exceeding 2.00in. (50,8 mm.). Damage in excess of these limits, repair in accordance with FRS3440 (Ref.78-31-00, Approved Repairs).

(3) Distortion

(a) Distortion, bowing, stretching or kinking of the translating cowl locking mechanism crush tubes is not acceptable.

(b) Fraying, bulging or signs of overheating of flexible drive outer casings is not acceptable.

(c) Distortion of stiffeners is acceptable, provided the overall depth does not exceed twice material thickness, and the extent of the damage does not exceed 2.00in. (50,8 mm.).

(4) Scores and abrasions

(a) Scores are not acceptable in screwjacks.

(b) Scores in translating cowl, cold stream nozzle, reverser case, deflector vanes and mechanical drive housings are acceptable to a depth not exceeding 30% of the material thickness or 0.015in. (0.38 mm.) whichever is greater and not more than 6in. (152.40 mm.) in length.

(c) Scores in acoustic panels are acceptable, to a depth not exceeding 30% of the material thickness or 0.015in. (0.38 mm.) and not more than 4in. (101.60 mm.) in length. Damage in excess of these limits, repair in accordance with FRS3440 (Ref.78-31-00, Approved Repairs).

(d) Protective treatment (alodine or alodex) must be applied according to manufacturers instructions, to all scores after sharp edges have been burnished.

(5) Damage to translating cowl forward pressure seal Refer 78-31-01 FRS3505 for repair damaged or portions of missing seal may be deferred to next check.

C (6) Missing or damaged translating cowl sealing angles
C Ref.fig.601.

C (a) Any number of sealing angles are allowed to be
C missing or partially missing as long as damaged
C areas are trimmed away as required.

C (7) Missing translating cowl rubbing blocks (TWA stk Nbr
C 61-3065)

C (a) Up to 20 blocks missing per translating cowl are
C allowed if there are no more than 2 consecutive
C blocks missing in a 6 block area.

R (8) Acoustic panel fly on limit

R (a) A maximum of two panels missing is acceptable
R provided;

R (i) Missing panels are replaced within 60 flying
R hours

R (ii) Any loose/unsound material is removed

R (iii) Area is inspected every 12 flying hours for
R further damage

CR 2. Inspect Blocker Doors (Ref.Fig.604)

CR This inspection to be used on Check C and Jet Shop thrust
CR reversers only (limits not applicable when reverser is a
CR module schedule repair). Translating cowl must be translated
CR aft and cascade vanes at 5 and 8 o'clock position and removed
CR to gain access to blocker doors to perform inspection.

CR Reference clearances are not maximum or minimum and are given
CR for information and comparison purposes. It is not possible or
CR necessary to measure actual assembly clearances with the blocker
CR doors installed. Common sense must prevail when performing the
CR following inspections.

CR A. Finger Bracket Assembly

CR Grasp forward end of front flap and check for looseness.
CR Reference clearance is 0.030in. and thus will allow some
CR movement. If excessive, reject.

CR B. Center Hinges

CR Grasp each side of front flap at rear of flap near hinge
CR ears and check for looseness in hinge attachments. Any
CR looseness in hinge structure is cause for rejection.
CR Reference clearance in center hinges is 0.005in. and a
CR slight amount of movement caused by this clearance is
CR acceptable due to reference clearance of 0.012in. If
CR movement is excessive, reject.

CR C. Rear Hinges

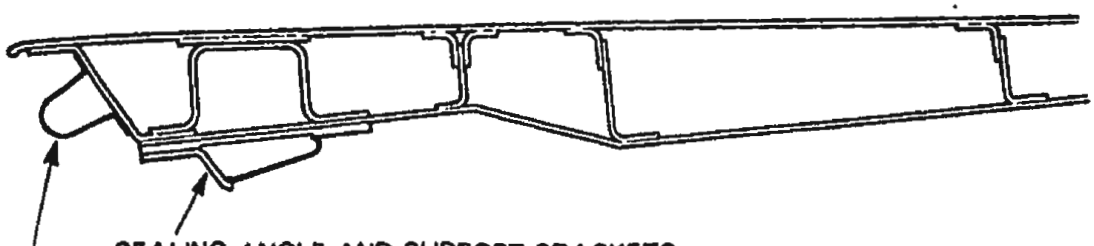
CR Grasp rear flap at each side near rear of flap and check for
CR looseness. Reference clearance in rear hinge is 0.010in., so
CR some movement is acceptable. If excessive, reject.

CR D. Acoustic Panels

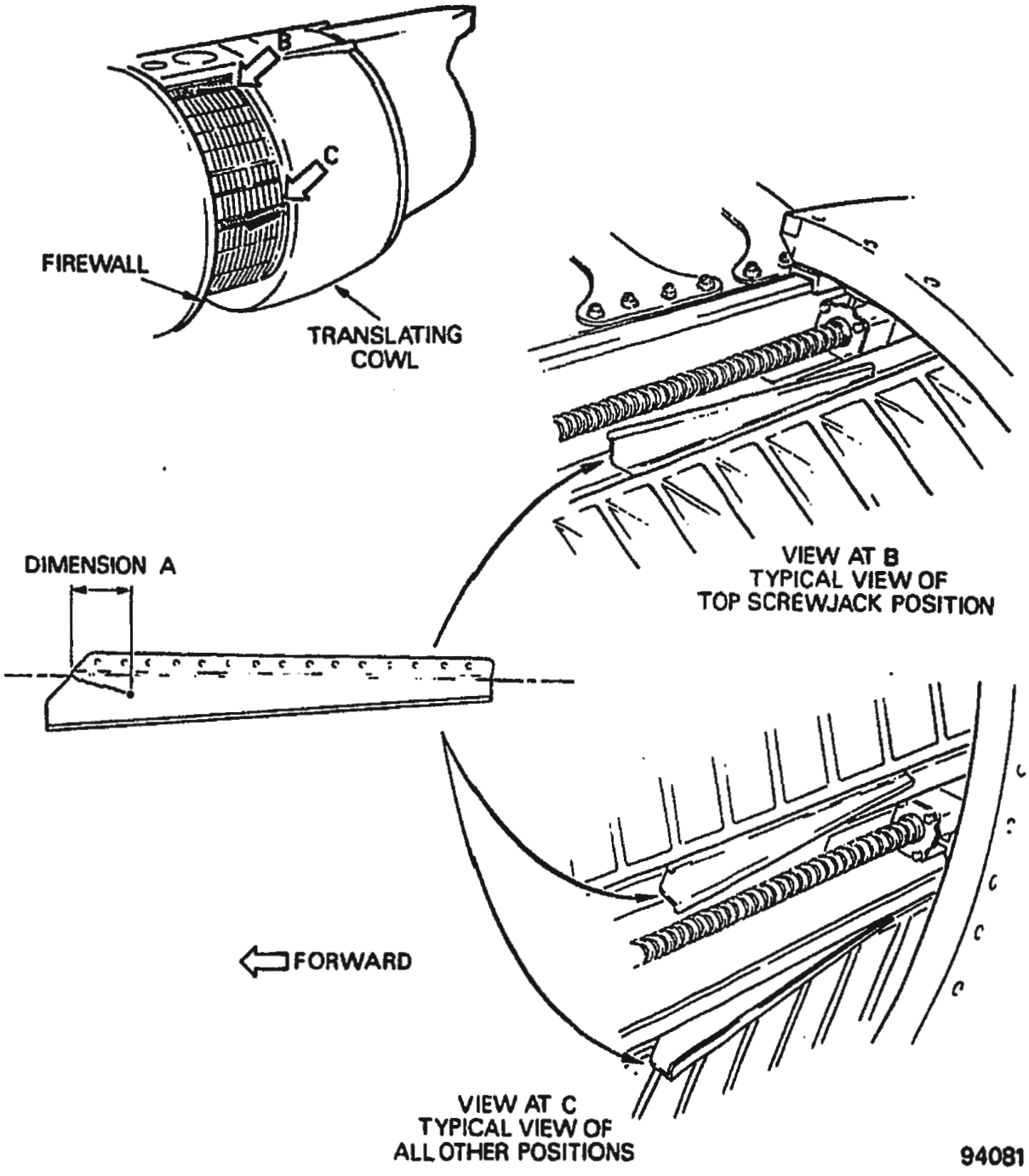
CR Generally, damage to acoustic panels is acceptable, provided
CR loss of panel is not imminent.

CR E. Balance of Assembly

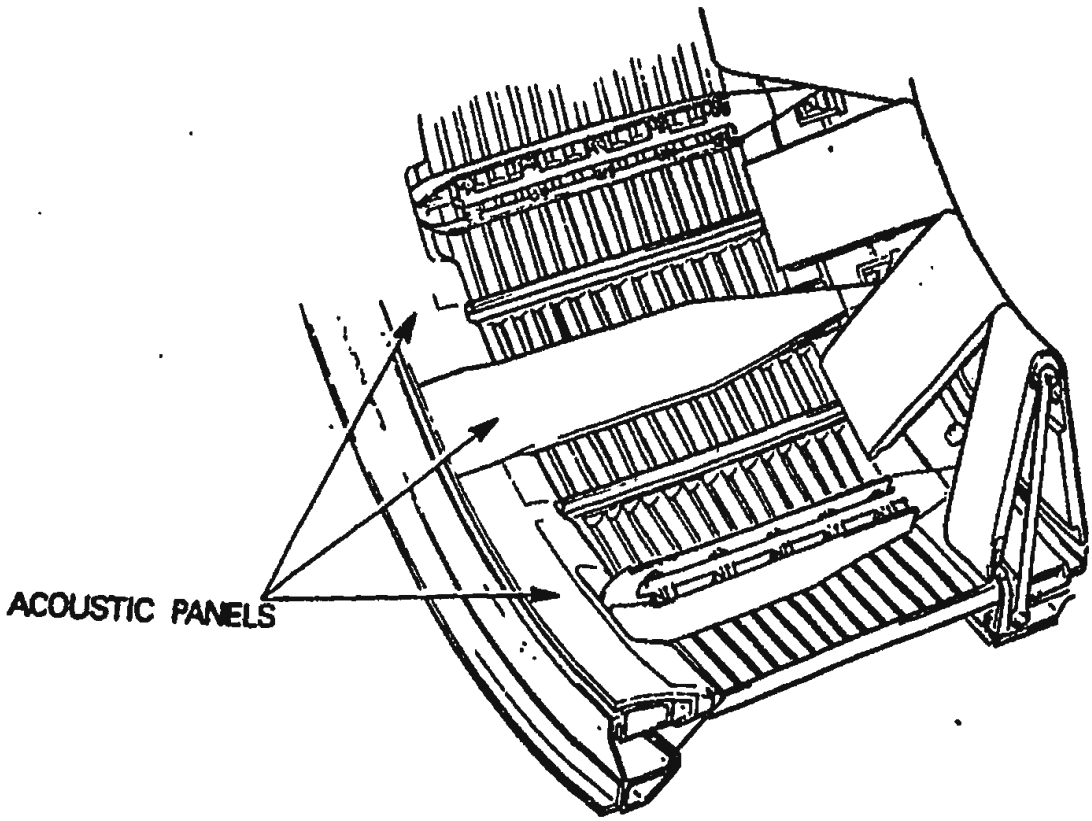
CR Generally, minor damage is acceptable provided basic
CR structure is not impared.



C Translating cowl front seal and support brackets
C Fig.601

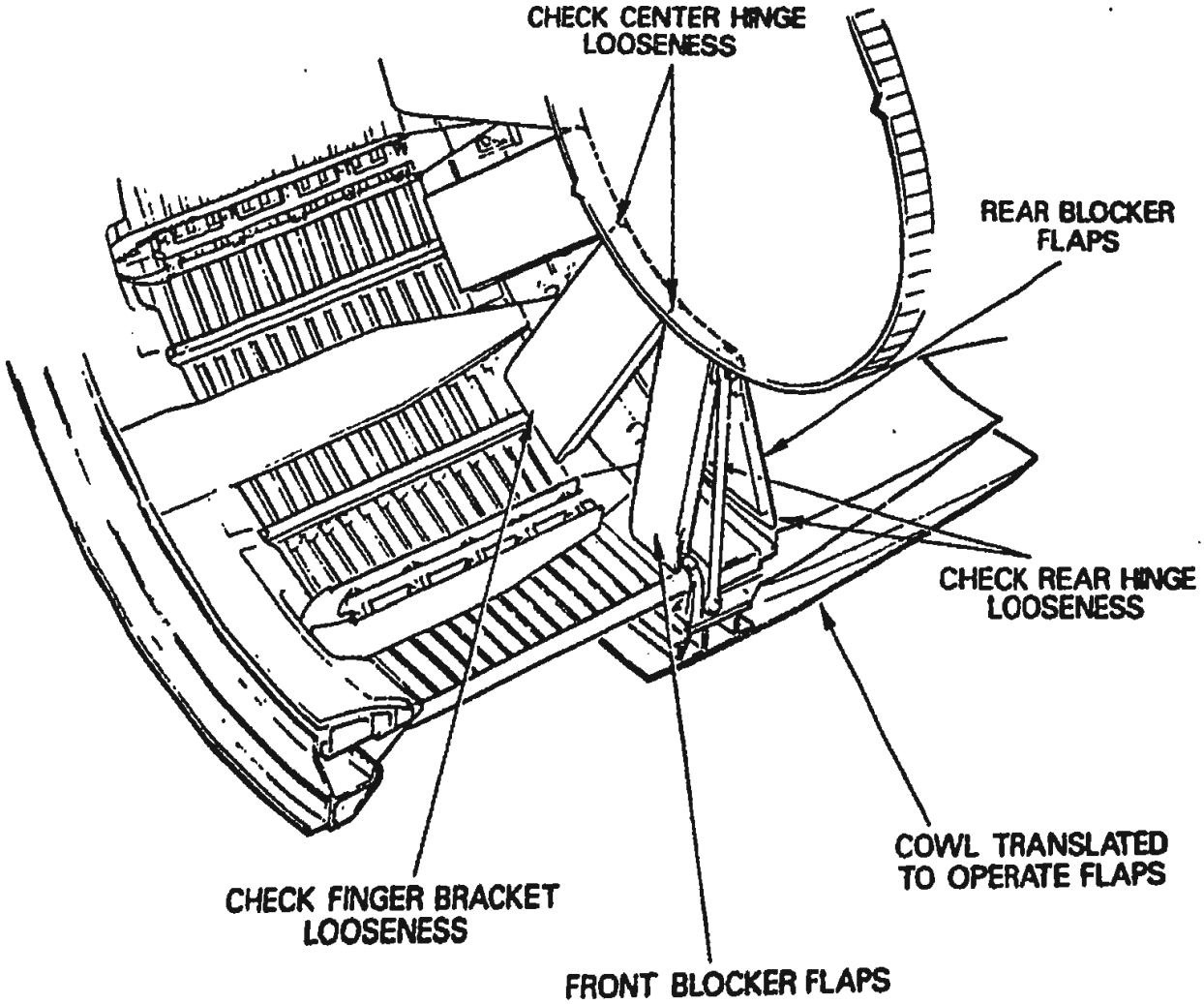


Sealing strip - Inspection/Check
Fig.602



99102

Acoustic panels - Inspection/Check
Fig.603



VIEW OF THRUST REVERSER EXTENDED POSITION

A8432

Inspection of Blocker Flaps
Fig.604

R COLD STREAM THRUST REVERSER SYSTEM

R APPROVED REPAIRS

R LIST OF REPAIRS

R	Repair No.	Title	Page No.
R		Replacement of Jackscrew Beam Honeycomb Tray	803
R	FRS3440	Cold Stream Thrust Reverser - Repair Acoustic Lining	807
R	FRS6563	Cold Stream Thrust Reverser - Repair Urbonded Acoustic Panels	817

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C COLD STREAM THRUST REVERSER SYSTEM - APPROVED REPAIRS

C 1. Replacement of Jackscrew Beam Honeycomb Tray

C NOTE: Use this repair when a honeycomb tray, which covers the
C jackscrew, is missing.

C 2. Cold stream thrust reverser fixed structure acoustic panel
C damage - Fly on Limits

C A. General

C NOTE: This is the perforated skin/honeycomb structure bonded
C to the inner duct surface of the T/R front ring and the
C six axial member joining the front and rear rings.
C Reference Figure 801.

C (1) If damage to the skin/honeycomb is such that it is loose
C or unsound and repairs/replacement cannot be expediently
C accomplished, operation of the condition may continue for
C a maximum of 25 hours with the following conditions.

C (a) Any loose/unsound material is removed.

C (b) Total damaged area does not exceed a surface area
C equivalent to the acoustic surface area on two
C axial members. Reference Figure 801.

C (c) All blocker flaps/swivel flaps are installed.

C (d) Damage is reinspected after every ten hours.

C 3. Equipment and Materials

C A. Filler - EC3524BA (50-1135) - Mixing per manufacturers
C instructions

C 4. Procedure

C A. Replace tray

C (1) Remove any remaining pieces of honeycomb tray from
C jackscrew beam (Ref.Figure 801).

C (2) Degrease beam area to prepare for bonding.

C (3) Apply 1/4-inch thick layer of blue filler over entire
C area of jackscrew beam where replacement tray will fit.

C (4) Press replacement tray into uncured blue filler; and
C using weights, clamps, etc., retain tray in place.

C (5) Allow to cure a minimum of eight hours at 75 deg.F.
C Lower temperatures will prolong curing.

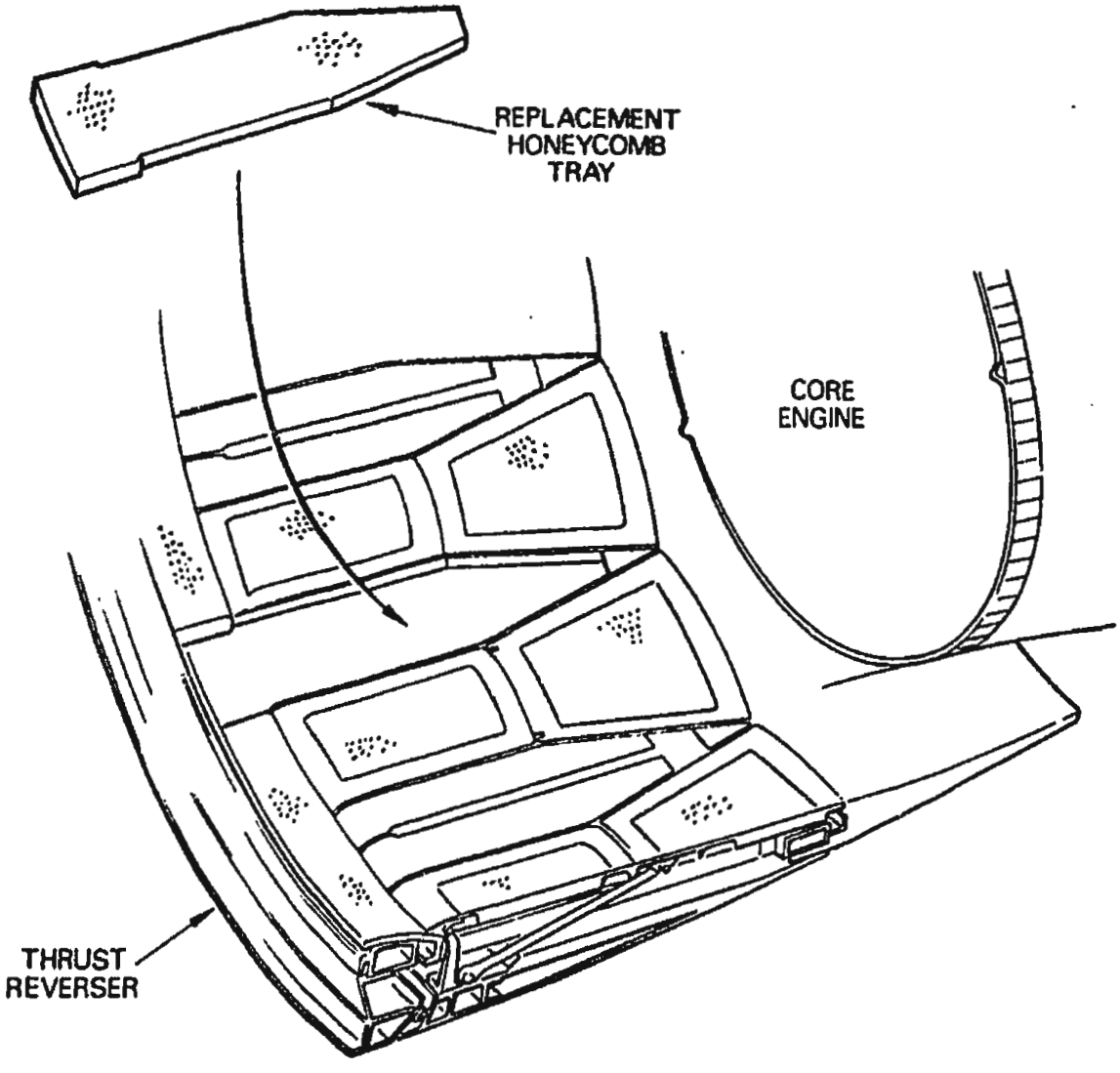
C B. Optional repair for tray with partial honeycomb missing

C (1) Fair or remove any jagged or disbonding areas.

C (2) Clean beam area to prepare for bonding.

C (3) Apply blue filler to repair area until it fairs with
C existing surrounding surface.

C (4) Allow to cure.



NOTE: Section through core engine and thrust reverser showing installation of jackscrew beam honeycomb tray

69941

C
C Jackscrew Beam Honeycomb Tray Installation
Figure 801

R.

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COLD STREAM THRUST REVERSER SYSTEM
REPAIR ACOUSTIC LINING FRS3440

1. Effectivity

I.P.C. Fig./Item	Part No.		
78-32-06			
02 005	LJ28482	SB78-4327	Part 4
	LJ28484	SB78-4327	Part 5
	LJ28486	SB78-4327	Part 6
	LJ28488	SB78-3757	
	LJ28502	SB78-4563	Part 1
	LJ28503	SB78-4563	Part 2
	LJ28504	SB78-4563	Part 4
	LJ28505	SB78-4563	Part 5
	LJ28506	SB78-4563	Part 6
	LJ28510	SB78-3844	
	LJ28519	SB78-4638	Part 1
	LJ28525	SB78-4638	Part 5
	LJ28531	SB78-4638	Part 4
	LJ28532	SB78-4638	Part 6
	LJ28534	SB78-4638	Part 7
	LJ28536	SB78-4638	Part 8
	LJ28538	SB78-4613	Part 1
	LJ28539	SB78-4613	Part 4
	LJ28540	SB78-4613	Part 5
	LJ28541	SB78-4613	Part 6
	LJ28542	SB78-4613	Part 7
	LJ28543	SB78-4613	Part 8
	LJ28653	SB78-4954	Part 1
	LJ28661	SB78-4954	Part 4
	LJ28662	SB78-4954	Part 6
	LJ28666	SB78-4954	Part 7
	LJ28668	SB78-4954	Part 8
	LJ28774	SB78-4980	Part 1
	LJ28782	SB78-4980	Part 4
	LJ28783	SB78-4980	Part 5
	LJ28785	SB78-4980	Part 6
	LJ28787	SB78-4980	Part 7
	LJ28789	SB78-4980	Part 8
	LJ28800	SB78-5094	Part 1
	LJ28808	SB78-5094	Part 4
	LJ28809	SB78-5094	Part 5

I.P.C Fig./Item	Part No.		
78-32-06			
02 005	LJ28811	SB78-5094	Part 6
	LJ28813	SB78-5094	Part 7
	LJ28815	SB78-5094	Part 8
	LJ29305	SB78-5308	
	LJ34304	SB78-6642	Part 1
	LJ34852	SB78-7887	Part 1
	LJ34854	SB78-7887	Part 2
	LJ34856	SB78-7887	Part 3
	LJ34860	SB78-7887	Part 6
	LJ34861	SB78-7887	Part 7
	LJ34862	SB78-7887	Part 8
	LJ34863	SB78-7887	Part 9
	LJ34864	SB78-7887	Part 10
	LJ35994	SB78-6642	Part 2
	LJ35996	SB78-6642	Part 3
	LJ36004	SB78-6642	Part 6
	LJ36005	SB78-6642	Part 7
	LJ36007	SB78-6642	Part 8
	LJ36009	SB78-6642	Part 9
	LJ36011	SB78-6642	Part 10

2. General

A. This Repair details the method of repairing fan thrust reverser case acoustic lining.

B. Overhaul Processes (O.P.) referred to in the text are detailed in Engine Overhaul Processes Manual T.S.D.594.

3. Instructions

A. WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION AND DEACTIVATED (REF.78-30-00, SERVICING) WHILE WORK IS IN PROGRESS.

Deactivate and lock thrust reverser in forward thrust position (Ref.78-30-00, Servicing).

B. Prepare damaged area of lining for filling

R	PROCEDURE	RELATED DATA
	(1) Dress area to remove loose debris or drill a hole or holes for injection of filler into damaged area	Refer to Fig.802 and 803, use portable drilling equipment and hand tools
	(2) Lightly planish if necessary	Refer to Fig.803, Section AD. Ensure edges of damaged area are underflush

C. Degrease damaged area of lining

R	PROCEDURE	RELATED DATA
	(1) WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE VENTILATION, AVOID SKIN CONTACT AND INHALING THE VAPOUR.	
	Thoroughly degrease area	Drench in OMat 1/21 inhibited and stabilized 1.1.1 trichloroethane

(2) Immediately dry out area with air blast
Use oil free compressed air

D. Prepare filling material EC3524B/A

R	PROCEDURE	RELATED DATA
	(1) Measure out materials of filler, as follows:	
	(a) 100 parts EC3524A (blue)	
	(b) 94 parts EC3524B (white)	Use OMat 874 filler two-pack EC3524B/A. Use precision weighing scales
	(2) Mix materials, by kneading until a uniform blue colour without streaks is obtained	Use standard mixing equipment and spatula
	(3) Spread material on to a clean surface, to a depth of approximately 12,7 mm. (0.500in.)	This allows exothermic heat dissipation and provides maximum working life of 1 hour at room temperature 22 deg.C. (72 deg.F.)

E. Apply filler to damaged area of lining

R	PROCEDURE	RELATED DATA
	(1) Slightly overfill damaged area	Use hand tools or pneumatic injection gun
	(2) Partially cure	Allow sufficient time for filling material to start to stiffen

(3) Remove excess material

Use a clean warm pallet knife or trowel.
Remove majority of excess material by a planing or burnishing action

NOTE: Clean blade before reheating

F. Cure repair

R	PROCEDURE	RELATED DATA
	(1) Cure	24 hours at room temperature 22 deg.C. (72 deg.F.). Lower temperature will prolong cure time. Higher temperature will accelerate cure time - 93 deg.C. (200 deg.F.) to 1/2 hour approximately. Use of a heat gun is optional

G. Restore contour of component

R	PROCEDURE	RELATED DATA
	(1) Blend filling material to contour	Use hand tools and glass paper. Carry out immediately material is hard to the touch

H. Reprotect lining repair

R	PROCEDURE	RELATED DATA
	(1) Paint repaired area	Use OMat 7/22 air drying high heat resisting touch-up enamel, aluminium, PL.82. Refer to T.S.D.594, O.P.341

J. Inspect lining repair

R	PROCEDURE	RELATED DATA
	(1) Visually inspect	

K. Record lining repair

R	PROCEDURE	RELATED DATA
	(1) Vibro-engrave FRS3440 adjacent to the part number	Use vibro-engraving equipment

4. Material of Component

DESCRIPTION	RR SYMBOL	MATERIAL
Outer skin	LBR	Alclad sheet
Acoustic lining	LCL	Aluminium honeycomb
Acoustic lining	LBR	Aluminium perforate skin
Adhesive		Epoxy resin

5. Equipment and Material

A. Standard equipment

Portable drilling equipment
Hand tools
Degreasing equipment
Precision weighing scales
Filler mixing equipment
Spatula
Pneumatic injection gun (optional)
Pallet knife or trowel
Heat gun (optional)
Vibro-engraving equipment

B. Consumable materials

OMat 1/21	Inhibited and stabilized 1.1.1 trichloroethane
OMat 4/13	Filler
OMat 7/22	Air drying high heat resisting touch-up enamel, aluminium

NOTE: 1. To identify consumable materials, refer to Overhaul Materials Manual, OMat.

2. Additional consumable materials are called out in the following Overhaul Process: O.P.341.

C. Special tools - none required

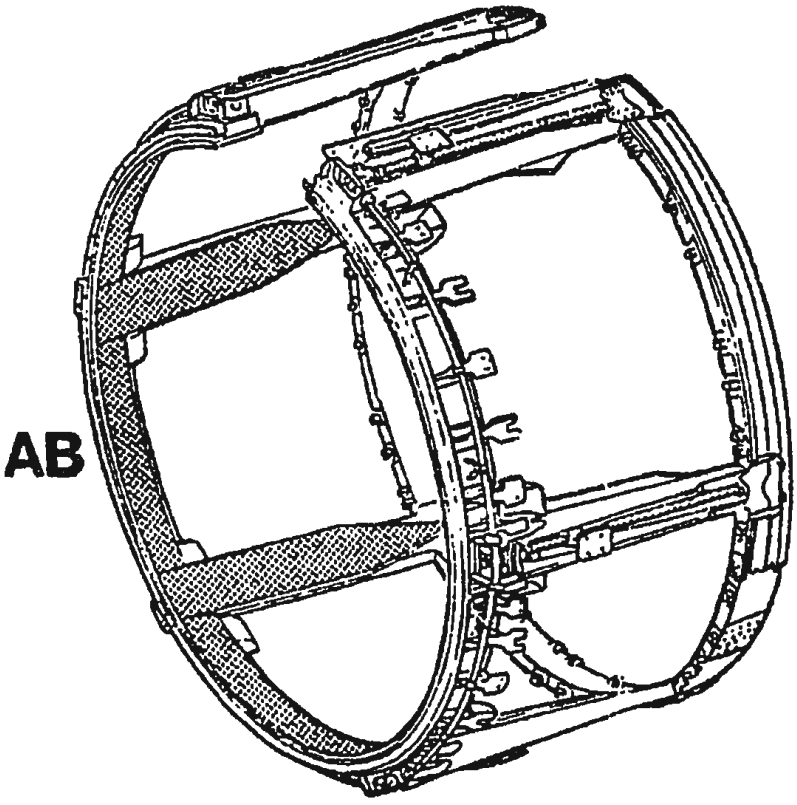
D. Expendable parts - none required

E. Repair parts - none required

6. Price and Availability

Refer to Rolls-Royce plc.

EXTENT OF REPAIR NOT TO EXCEED 50% OF THE AREA OF EACH ACCOUSTIC LINING.

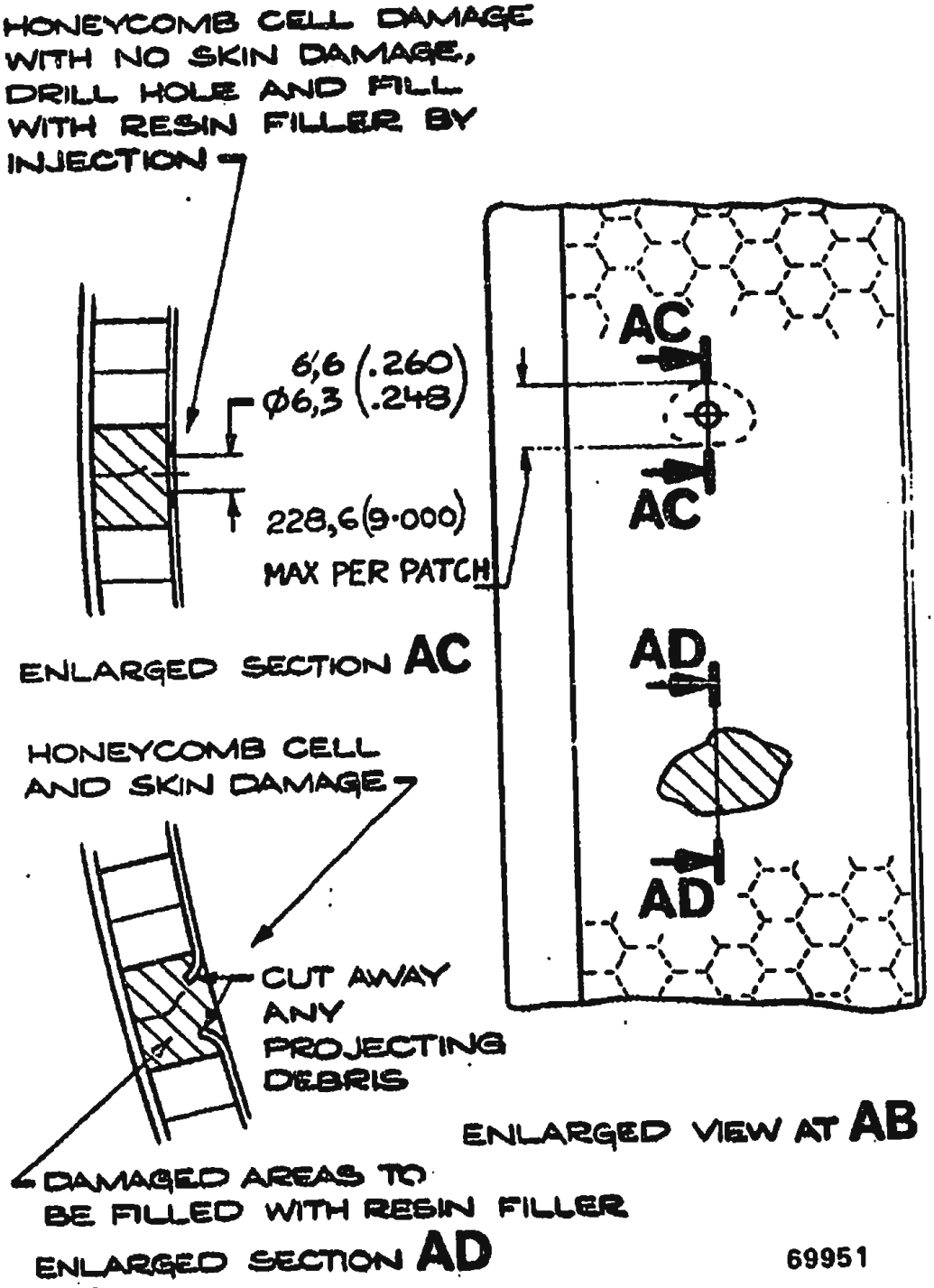


TYPICAL VIEW ON THRUST REVERSER CASE ASSEMBLY.

ALL DIMENSIONS ARE IN MILLIMETRES WITH INCH CONVERSIONS IN PARENTHESES.

GEOMETRIC SYMBOLS CONFORM TO I.S.O. R1101 - 1969. 69950

Thrust Reverser Acoustic Lining
Fig.802



Acoustic Lining - Typical Repair
Fig.803

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R COLD STREAM THRUST REVERSER SYSTEM
R REPAIR UNBONDED ACOUSTIC PANELS FRS6563

R 1. Effectivity

R I.P.C. Fig./Item	Part No.		
R 78-32-06			
R 02 005	LJ24326	SB 78-3274	
R	LJ24331	SB 78-3282	
R	LJ24344	SB 78-3437	
R	LJ24403	SB 78-3786	Part 1
R	LJ24405	SB 78-3786	Part 2
R	LJ24410	SB 78-3777	
R	LJ24412	SB 78-3852	Part 1
R	LJ24414	SB 78-3852	Part 2
R	LJ24433	SB 78-4009	
R	LJ24436	SB 78-4123	Part 1
R	LJ24442	SB 78-4123	Part 2
R	LJ24444	SB 78-4123	Part 4
R	LJ24446	SB 78-4123	Part 5
R	LJ28475	SB 78-4327	Part 1
R	LJ28476	SB 78-4327	Part 2
R	LJ28482	SB 78-4327	Part 4
R	LJ28484	SB 78-4327	Part 5
R	LJ28486	SB 78-4327	Part 6
R	LJ28488	SB 78-3757	
R	LJ28493	SB 78-4230	
R	LJ28502	SB 78-4563	Part 1
R	LJ28503	SB 78-4563	Part 2
R	LJ28504	SB 78-4563	Part 4
R	LJ28505	SB 78-4563	Part 5
R	LJ28506	SB 78-4563	Part 6
R	LJ28510	SB 78-3844	
R	LJ28519	SB 78-4638	Part 1
R	LJ28525	SB 78-4638	Part 5
R	LJ28531	SB 78-4638	Part 4
R	LJ28532	SB 78-4638	Part 6
R	LJ28534	SB 78-4638	Part 7
R	LJ28536	SB 78-4638	Part 8
R	LJ28538	SB 78-4613	Part 1
R	LJ28539	SB 78-4613	Part 4
R	LJ28540	SB 78-4613	Part 5
R	LJ28541	SB 78-4613	Part 6
R	LJ28542	SB 78-4613	Part 7
R	LJ28543	SB 78-4613	Part 8

I.P.C Fig./Item	Part No.		
78-32-06			
02 005	LJ28653	SB 78-4954	Part 1
	LJ28661	SB 78-4954	Part 4
	LJ28662	SB 78-4954	Part 5
	LJ28664	SB 78-4954	Part 6
	LJ28666	SB 78-4954	Part 7
	LJ28668	SB 78-4954	Part 8
	LJ28774	SB 78-4980	Part 1
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	LJ28783	SB 78-4980	Part 5
	LJ28785	SB 78-4980	Part 6
	LJ28787	SB 78-4980	Part 7
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	LJ28800	SB 78-5094	Part 1
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	LJ28813	SB 78-5094	Part 7
	LJ28815	SB 78-5094	Part 8
	LJ29305	SB 78-5308	
	LJ34304	SB 78-6642	Part 1
	LJ34852	SB 78-7887	Part 1
	LJ34854	SB 78-7887	Part 2
	LJ34856	SB 78-7887	Part 3
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	LJ34861	SB 78-7887	Part 7
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	LJ34864	SB 78-7887	Part 10
	LJ35994	SB 78-6642	Part 2
	LJ35996	SB 78-6642	Part 3
	LJ36004	SB 78-6642	Part 6
	LJ36005	SB 78-6642	Part 7
	LJ36007	SB 78-6642	Part 8
	LJ36009	SB 78-6642	Part 9
	LJ36011	SB 78-6642	Part 10

2. General

A. This Repair details the method of repairing standard thrust reverser fixed structure unbonded acoustic panel perforate skin.

B. Overhaul Processes (O.P.) referred to in the text are detailed in Engine Overhaul Processes Manual T.S.D.594.

R 3. Instructions

R WARNING: MAKE SURE THE THRUST REVERSER SYSTEM IS ALWAYS
R LOCKED IN THE FORWARD OR REVERSE THRUST POSITION
R (REF.78-30-00, SERVICING) AS REQUIRED WHILE WORK IS
R IN PROGRESS.

R A. Deactivate and lock thrust reverser in the required position
R (Ref.78-30-00, Servicing).

R B. Bond acoustic panel perforate skin.

R	PROCEDURE	RELATED DATA
R	(1) Drill holes in the area of unbonded perforate skin for resin filler	Refer to Fig.803 and Fig.804. Use portable drilling equipment and hand tools. Drill holes in centre of honeycomb cells
R	(2) Remove swarf	Use vacuum equipment

R WARNING: WHEN USING DEGREASING FLUID WEAR PROTECTIVE
R CLOTHING AND MAKE SURE THE WORK AREA IS WELL
R VENTILATED.

R	PROCEDURE	RELATED DATA
R	(3) Cold liquid degrease the area of unbonded perforate skin	Use OMat 135 MEK. Use a squeeze bottle to spray a substantial amount of MEK through the drilled holes to clean the inner surfaces. Refer to T.S.D.594-J, O.P.101
R	(4) Immediately dry out the area with an air blast	Use an oil free, dry air blast

	PROCEDURE	RELATED DATA
R	WARNING: WHEN PREPARING AND USING RESIN FILLER WEAR PROTECTIVE CLOTHING AND AVOID CONTACT WITH SKIN.	
R	(5) Prepare the filler	
R	(a) Mix 100 parts EC3524B (blue) and 94 parts EC3524A (white)	
R	(b) Mix materials until a uniform blue colour is obtained	Use OMat 874 filler two-pack. Use weighing equipment 0 to 200 grams. Refer to T.S.D.594-J, O.P.707
R	(6) Prepare the resin	
R	(a) Mix 70 parts resin and 30 parts hardener	
R	(b) Mix materials until a uniform cream colour is obtained	Use OMat 805 resin and OMat 806 hardener. Refer to T.S.D.594-J, O.P.707
R	NOTE: Prepare the filler and the resin simultaneously in separate containers.	
R	(7) Prepare the resin filler	Mix components in a 50:50 ratio by volume until a uniform blue colour is obtained
R	(8) Spread the resin filler on to a clean surface to a depth of approximately 12 mm. (0.5in.)	This allows heat from the resin filler mixture to dissipate and provides the maximum working life of 1 hour at 22 deg.C. (72 deg.F.)
R	(9) Prepare to apply the resin filler to unbonded areas of perforate skin	Use a rivet clamp to lift the unbonded perforate skin slightly from the honeycomb

	PROCEDURE	RELATED DATA
R (10)	Apply the resin filler through the resin injection holes in the unbonded area until the honeycomb cells are full and release the perforate skin	Refer to Fig.804. Use a pressure gun. Excess resin filler will exude from perforate skin holes
R (11)	Cure the resin filler	Use locally manufactured clamps to clamp the repair area. Cure for 24 hours at 22 deg.C. (72 deg.F.)

R NOTE: Lower temperatures will prolong cure times.

Higher temperatures will accelerate cure times.

The resin filler will not cure below 12 deg.C. (54 deg F.)

The minimum cure time is 30 minutes at 100 deg.C. (212 deg.F.).

	PROCEDURE	RELATED DATA
R (12)	Blend excess resin filler to restore original contour of repair area	Use hand tools and glass paper

R C. Inspect repair

	PROCEDURE	RELATED DATA
R (1)	Lightly tap test the repaired area to ensure the whole area is fully bonded	Repeat bonding procedure if repaired area is not fully bonded

R D. Restore protective coating

R PROCEDURE RELATED DATA

R WARNING: WHEN USING DEGREASING FLUID WEAR PROTECTIVE
R CLOTHING AND MAKE SURE THE WORK AREA IS WELL
R VENTILATED.

R (1) Cold liquid degrease the repaired
R areas
R Use OMat 135 MEK.
R Refer to T.S.D.594-J, O.P.101

R WARNING: WORK AREAS WHERE PRIMER OR PAINT IS MIXED OR USED
R MUST BE WELL VENTILATED.

R (2) Apply primer to the repaired areas
R Use OMat 766B two pack epoxy primer
R and catalyst.
R Refer to T.S.D.594-J, O.P.323

R (3) Apply paint to the repaired areas
R Use OMat 7/160 epoxy paint light grey
R finish and OMat 7/161 activator.
R Refer to T.S.D.594-J, O.P.323
R OR
R Use OMat 7/22 air drying high heat
R resisting touch-up enamel, aluminium,
R PL82.
R Refer to T.S.D.594-J, O.P.341

R E. Inspect repair

R PROCEDURE RELATED DATA

R (1) Visually inspect repaired area

R F. Record repair

R PROCEDURE RELATED DATA

R (1) Vibro-engrave FRS6563 adjacent to the
R part number
R Use vibro-engraving equipment

R 4. Material of Components

DESCRIPTION	RR SYMBOL	MATERIAL
Outer skin	LBR	Alclad sheet
Acoustic lining	LCL	Aluminium honeycomb
Acoustic lining	LBR	Aluminium perforate skin
Adhesive		Epoxy resin

R 5. Equipment and Material

R A. Standard equipment

Portable drilling equipment
Hand tools
Degreasing equipment
Pressure injection gun
Weighing equipment, 0 to 200 grams
Vibro-engraving equipment
Vacuum equipment
Locally manufactured clamps

R B. Consumable materials

OMat 135	Methylethylketone
OMat 7/22	Air drying high heat resisting touch up enamel, aluminium, PL82
OMat 7/160	Epoxy paint light grey finish
OMat 7/161	Activator
OMat 766B	Two-pack epoxy primer and catalyst
OMat 805	Resin
OMat 806	Hardener
OMat 874	Filler, two-pack

NOTE: 1. To identify consumable materials, refer to the Overhaul Materials Manual, OMat.

2. Additional consumable materials are called out in Overhaul Processes referenced within this Repair.

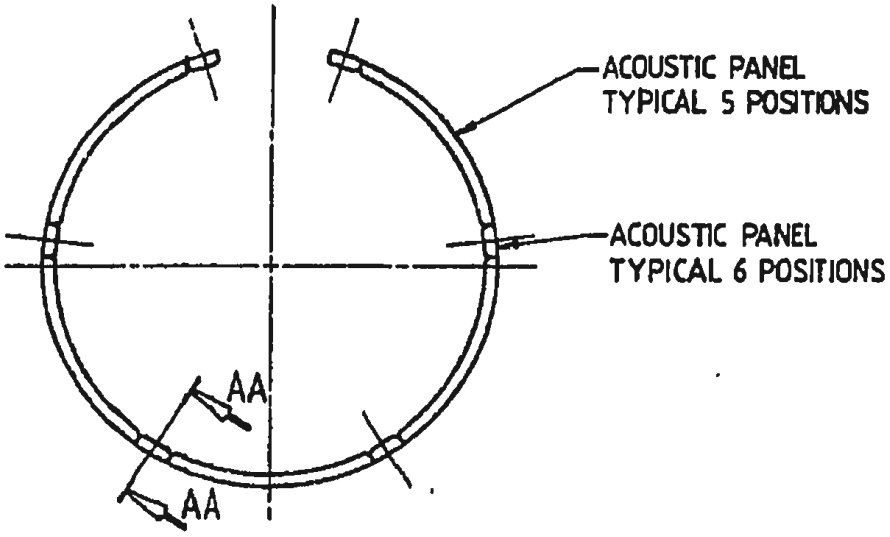
R C. Special tools - none required

R D. Expendable parts - none required

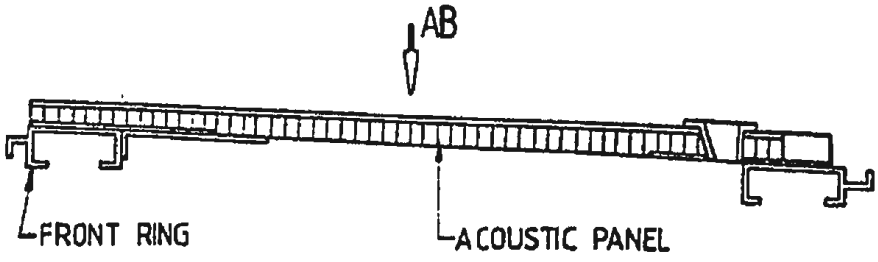
R E. Repair parts - none required

R 6. Price and Availability

R Refer to Rolls-Royce plc.



DIAGRAMMATIC SECTION THRU FIXED STRUCTURE
LOOKING REARWARDS

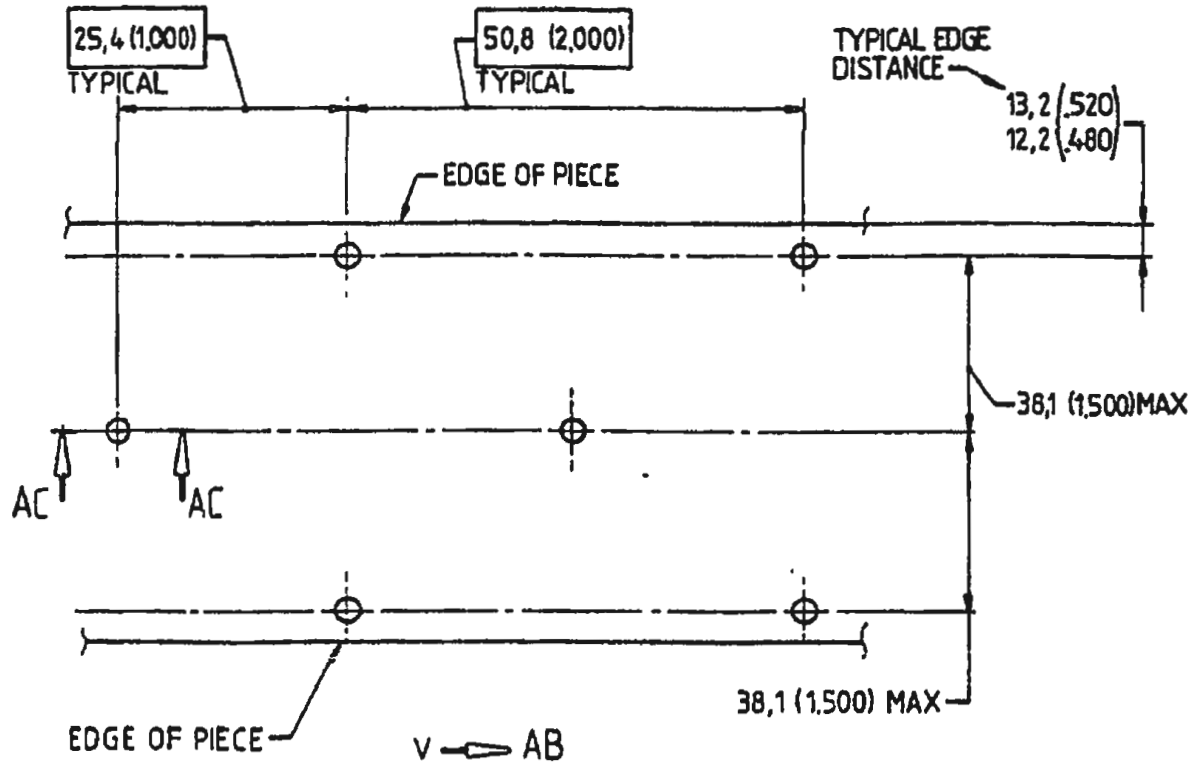


SECTION AA

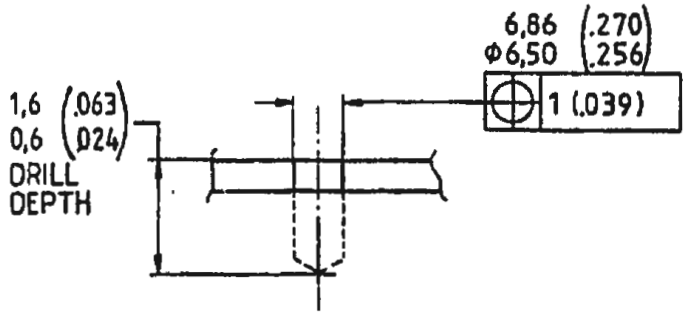
GEOMETRIC SYMBOLS CONFORM TO ISO 1101-1969.
DIMENSIONS ARE IN MILLIMETRES WITH INCH-CONVERSIONS IN PARENTHESES.
TOUCH UP PAINT WHERE NECESSARY IN ACCORDANCE WITH ACCOMPLISHMENT INSTRUCTIONS.

A6232

R Thrust Reverser Acoustic Panels
R Fig.804



TYPICAL ALL ACOUSTIC POSITIONS
SHOWING TYPICAL AREA OF DE-BONDING
NUMBER OF ROWS DEPENDANT ON AREA OF REPAIR



SECTION AC
TYPICAL ALL HOLES
NUMBER OFF AS REQUIRED

A6233

R Acoustic Panels - Typical Repair of De-bonded Area
R Fig.805

SELECTOR VALVE - MAINTENANCE PRACTICES

1. Removal/Installation Selector Valve

Service Bulletins referred to:

S.B.71-3137 - Thrust reverser selector, revised attachment

Referenced Procedures:

70-51-00 - Torque Tightening Technique
71-00-00 - Power Plant - Adjustment/Test
71-11-00 - Cowling, Engines No.1 and No.3 - Servicing
R 71-12-05 - Cowling, Engine No.2 - Servicing
76-11-00 - Engine Power and Thrust Reverser Control Linkage - Adjustment Test

A. Remove Selector Valve

(1) Tag throttle control levers and thrust reverser levers. Tag APU/GRD AIR TO REVERSER switches.

(2) On pilots overhead circuit breaker panel CB1, zone 210, open and tag appropriate THRUST REVERSE circuit breaker.

(3) On Flight engineer/Second officers aft circuit breaker panel CB3, zone 215, open and tag appropriate START AIR VALVE circuit breaker.

(4) Tag appropriate ENGINE START panel switchlights.

(5) Open left-hand hinged cowl, 413A or 423A for engines No.1 and 3 (Ref. 71-11-00) or left-hand upper hinged cowl
R 433DL for engine No.2 (Ref. 71-12-05).

(6) Refer to fig.201, disconnect electrical connector (1) and connect to parking receptacle (9).

(7) Disconnect control rod (2).

(8) Disconnect connectors (3) through (5).

(9) On engines without S.B.71-3137 remove nuts (6) and (7). On engines with S.B.71-3137 - remove nuts (6) and bolt (7).

(10) Remove selector valve from support assembly (8).

(11) Fit approved blanks to all exposed apertures and connectors.

B. Install Selector Valve

(1) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Lockwire	DTD.189A 22 S.W.G.	- 21 A.W.G.	238

(2) Ensure circuit breakers are open and systems tagged as detailed in A.(1) through (4).

(3) Remove blanks, if fitted, from all apertures and connectors.

(4) Refer to fig.201, position selector valve on support assembly (8), on engines without S.B.71-3137 secure with nuts (6) and (7). On engines with S.B.71-3137, secure with nuts (6) and bolt (7).

(5) Connect and secure (Ref. 70-51-00) connectors (3) through (5), wirelock.

(6) Disconnect electrical connector (1) from receptacle (9), connect and secure to selector valve.

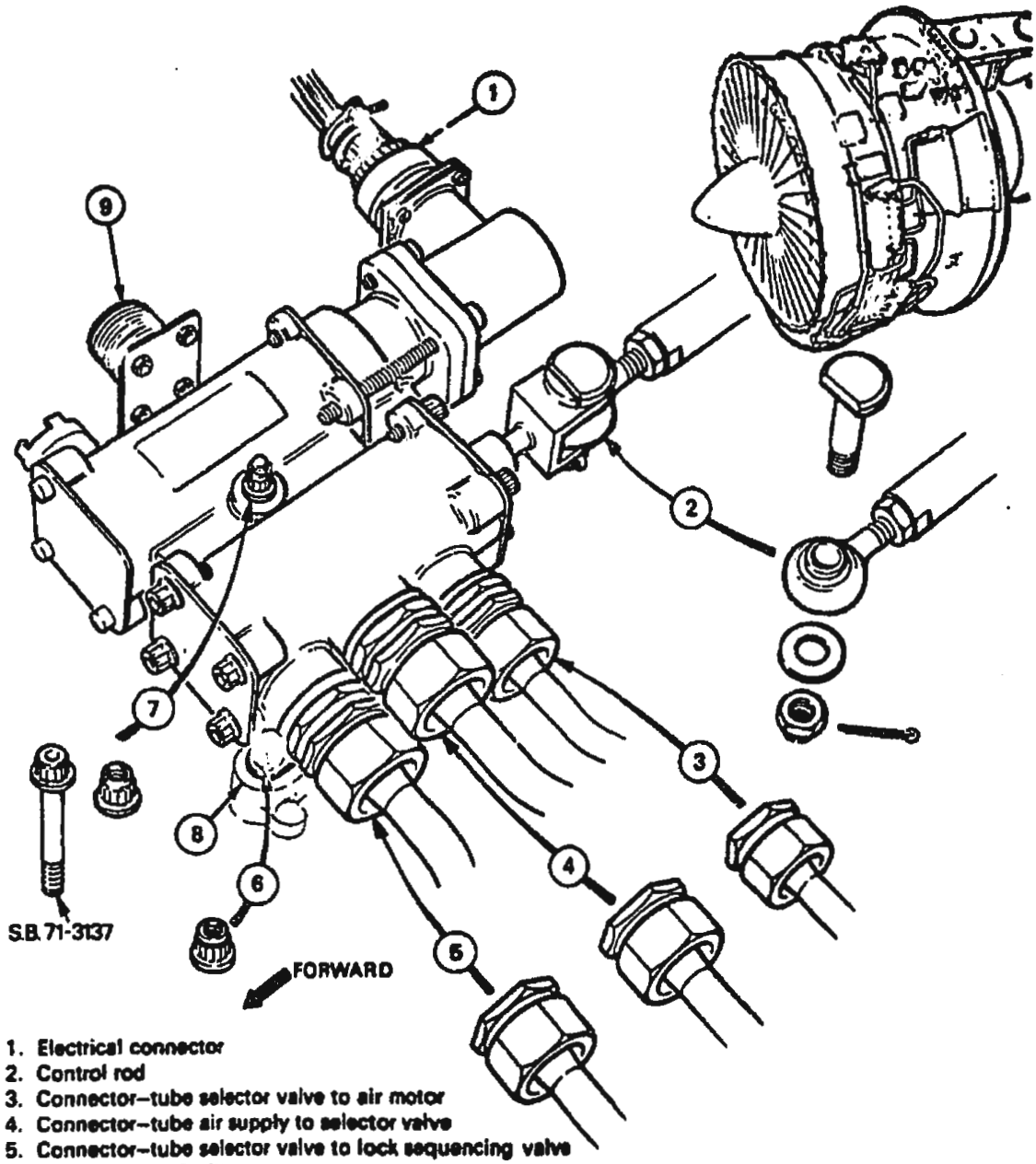
(7) Connect and secure control rod (2), lock nut with new cotter pin.

(8) Remove tags and close circuit breakers opened in A (1) through (4).

(9) Set selector valve control linkage (Ref.76-11-00).

(10) Before next flight operationally test thrust reverser system (Ref. 71-00-00).

(11) Close left-hand hinged cowl, 413A or 423A for engines No.1 and 3 (Ref. 71-11-00) or left-hand upper
R hinged cowl 433DL for engine No.2 (Ref. 71-12-05).



1. Electrical connector
2. Control rod
3. Connector–tube selector valve to air motor
4. Connector–tube air supply to selector valve
5. Connector–tube selector valve to lock sequencing valve
6. Securing nut (2 off)
7. Securing nut (Securing bolt S.B.71-3137)
8. Support assembly
9. Parking receptacle for electrical connector

25760B

Selector valve disconnect points
Fig.201

PRESSURE REGULATING AND SHUT-OFF VALVE - MAINTENANCE PRACTICES

1. Removal/Installation Pressure Regulating and Shut-off Valve - Engines not incorporating S.B.78-3571 and Garrett AiResearch S.B.898330-78-1165

Service Bulletins referred to:

S.B.71-2195 - Improved E-type Seals, not Silver-plated
S.B.78-3571 - Introduction of Pressure Regulator with Remote Deactivation.
Garrett AiResearch S.B.898330-78-1165 - Incorporate Fitting with Additional Outlet

Referenced Procedures:

70-12-02	Fitting Vee Band Coupling Clamps
70-51-00	Torque Tightening Technique
71-00-00	Power Plant - Adjustment/Test
72-03-00	Gas Generator Fairings - Removal/Installation
78-30-00	Thrust Reverser - Servicing

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located, are as follows:

71-50-01	Engine Light Duty Electrical Harness
78-31-02	Pressure Regulating and Shut-off Valve Installation
78-31-05	Engine Mounted Air Tubes
78-31-40	Power Plant Mounted Air Tubes

A. Remove Valve

(1) Equipment required:

CP.20309 or XUT.37594	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece
AVT.2819	Extractor tool

(2) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00).

(3) Position working platform in cold stream duct.

(4) Remove the following access panels (Ref. 72-03-00).

(a) Engines No.1 and 3:

R.H. front pylon fairing 418BR or 428BR
L.H. front pylon fairing 418BL or 428BL

(b) Engine No.2:

R.H. front pylon fairing 438BR
L.H. front pylon fairing 438BL

(5) CAUTION: ENSURE ELECTRICAL CONNECTOR IS FREE FROM LIQUID AND/OR SOLID CONTAMINATION BEFORE DISCONNECTING.
Refer to fig.201, disconnect electrical connector (1).

(6) Disconnect connectors (2) and (3).

(7) Support valve, remove coupling clamps (4) and remove valve.

(8) Remove (Ref. 70-12-02) E-type seal (5) from valve outlet and retain for fitment to new valve.

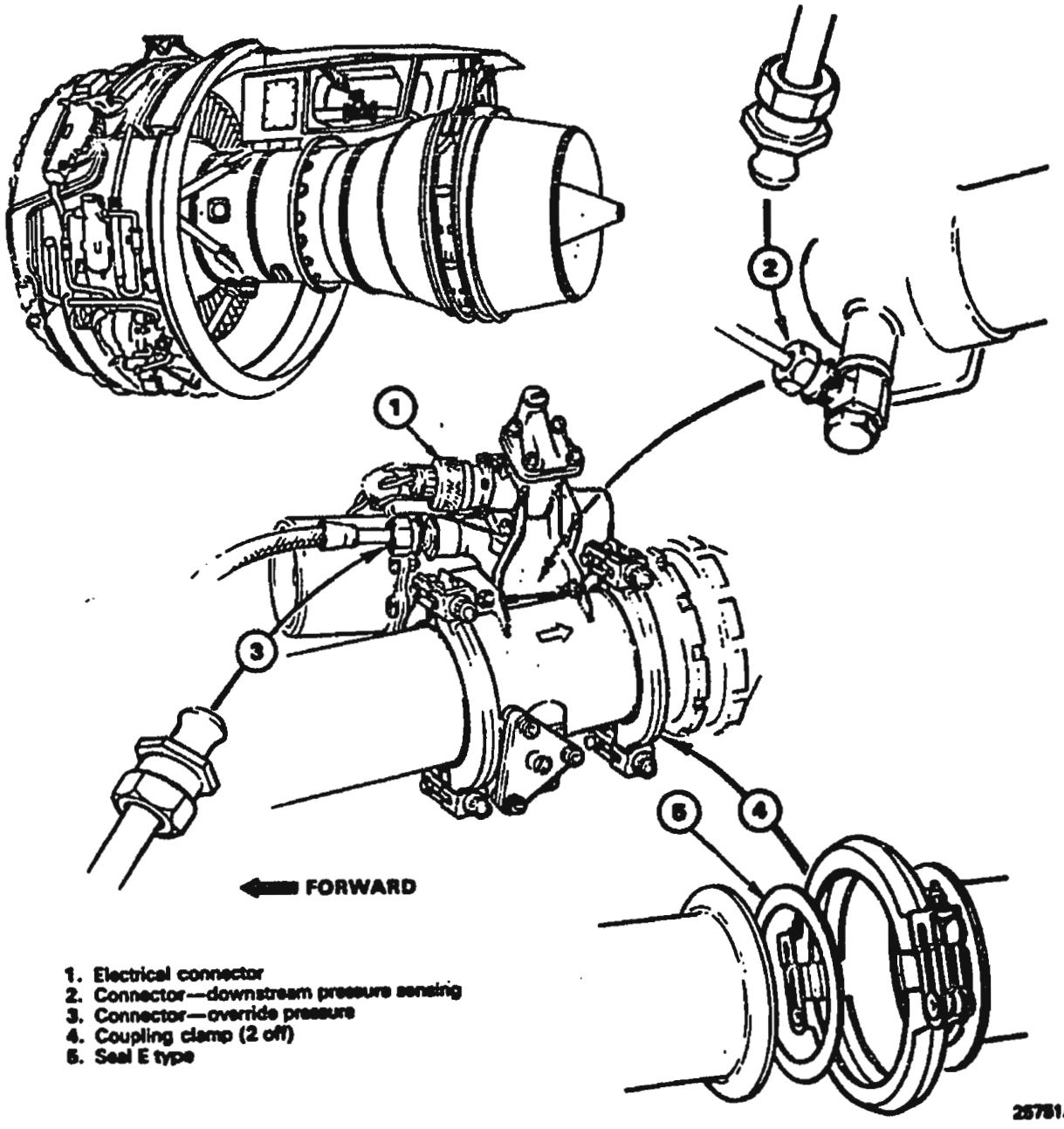
NOTE: On engines not incorporating S.B.71-2195, use extractor tool AVT.2819

(9) Fit approved blanks to all exposed apertures and connectors.

B. Install Valve

(1) Equipment required:

CP.20309 or XUT.37594	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece



Pressure regulating and shut-off valve disconnect points
Fig.201

(2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Lockwire	DTD.189A 22 S.W.G.	- 21 A.W.G.	238

(3) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation 1.A.(2).

(4) Ensure working platform is fitted in cold stream duct.

(5) Remove blanks from all apertures and connectors.

(6) Refer to fig.201, fit and check (Ref. 70-12-02) E-type seal (5) in valve outlet flange and check E-type seal in rigid tube flange.

(7) Prepare coupling clamps (4) and mating flanges for fitment (Ref. 70-12-02).

(8) Position valve in air supply duct, ensure arrow on valve body is pointing in direction of air flow (towards rear of engine).

(9) Fit coupling clamps (4), do not tighten.

(10) Connect and tighten (Ref. 70-51-00) connectors (2) and (3), wirelock.

(11) Secure and torque tighten clamps (4)(Ref. 70-12-02).

(12) CAUTION: ENSURE ELECTRICAL CONNECTOR IS FREE FROM LIQUID AND/OR SOLID CONTAMINATION BEFORE CONNECTING.
Connect and secure electrical connector (1).

(13) Fit (Ref. 72-03-00) access panels removed in operation 1.A. (4).

(14) Remove working platform.

(15) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00)

(16) Before next flight operationally test thrust reverser system (Ref. 71-00-00).

2. Removal/Installation Pressure Regulating and Shut-off Valve - Engines incorporating S.B.78-3571 and Garrett AiResearch S.B.898330-78-1165

Service Bulletins referred to:

S.B.71-2195 - Improved E-type Seals, not Silver-plated
S.B.78-3571 - Introduction of Pressure Regulator with Remote Deactivation
Garrett AiResearch S.B.898330-78-1165 - Incorporate Fitting with Additional Outlet.

Referenced Procedures:

70-12-02 - Fitting Vee Band Coupling Clamps
70-51-00 - Torque Tightening Technique
71-00-00 - Power Plant - Adjustment/Test
72-03-00 - Gas Generator Fairings - Removal/Installation
78-30-00 - Thrust Reverser - Servicing

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located, are as follows:

71-50-01 Engine Light Duty Electrical Harness
78-31-02 Pressure Regulating and Shut-off Valve Installation
78-31-05 Engine Mounted Air Tubes
78-31-40 Power Plant Mounted Air Tubes

A. Remove Valve

(1) Equipment required

CP.20309 or XUT.37594	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece
AVT.2819	Extractor tool

(2) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00).

(3) Position working platform in cold stream duct.

(4) Remove the following access panels (Ref. 72-03-00).

(a) Engines No.1 and 3:

R.H. front pylon fairing 418BR or 428BR
L.H. front pylon fairing 418BL or 428BL

(b) Engine No.2:

R.H. front pylon fairing 438BR
L.H. front pylon fairing 438BL

(5) CAUTION: ENSURE ELECTRICAL CONNECTOR IS FREE FROM LIQUID AND/OR SOLID CONTAMINATION BEFORE DISCONNECTING.
Refer to fig.201, disconnect electrical connector (1).

(6) Disconnect connectors (2) and (3).

(7) Refer to fig.202, disconnect connectors (1) and (2).

(8) Refer to fig.201, support valve, remove coupling clamps (4) and remove valve with tubes connected.

NOTE: Connectors (3) and (4) (Ref. fig.202) cannot be disconnected from an installed valve.

(9) Refer to fig.202, disconnect connectors (3) and (4), remove tubes complete with connected brackets and retain tubes for fitment to new valve.

(10) Remove (Ref. 70-12-02) E-type seal (5) from valve outlet and retain for fitment to new valve.

NOTE: On engines not incorporating S.B.71-2195, use extractor tool AVT.2819.

(11) Fit approved blanks to all exposed apertures and connectors.

B. Install Valve

(1) Equipment required

CP.20309 or XUT.37594	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece

(2) Material required

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Lockwire	DTD.189A 22 S.W.G.	- 21 A.W.G.	238

(3) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation 2.A.(2).

(4) Ensure working platform is fitted in cold stream duct.

(5) Remove blanks from all apertures and connectors.

(6) Refer to fig.202, fit tubes complete with connected brackets to valve, connect and tighten (Ref. 70-51-00) connectors (3) and (4), wirelock.

NOTE: Connectors (3) and (4) (Ref. fig.202), cannot be connected to an installed valve.

(7) Ensure bolt and nut (5) connecting tube brackets is secure.

(8) Refer to fig.201, fit and check (Ref. 70-12-02) E-type seal (5) in valve outlet flange and check E-type seal in rigid tube flange.

(9) Prepare coupling clamps (4) and mating flanges for fitment (Ref. 70-12-02).

(10) Position valve in air supply duct, ensure arrow on valve body is aligned with direction of air flow (towards rear of engine).

(11) Fit coupling clamps (4), do not tighten

(12) Connect and tighten (Ref. 70-51-00) connectors (2) and (3), wirelock.

(13) Secure and torque tighten clamps (4) (Ref. 70-12-02).

(14) CAUTION: ENSURE ELECTRICAL CONNECTOR IS FREE FROM LIQUID AND/OR SOLID CONTAMINATION BEFORE CONNECTING.
Connect and secure electrical connector (1).

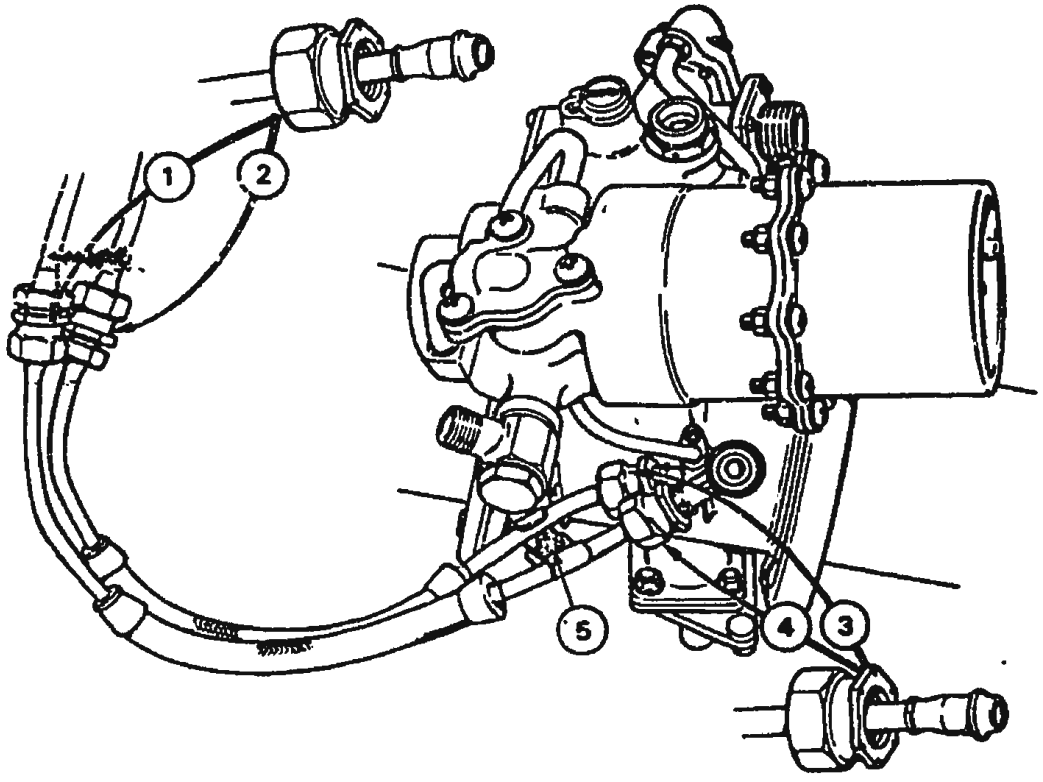
(15) Refer to fig.202, connect and tighten (Ref. 70-51-00) connectors (1) and (2), wirelock.

(16) Fit (Ref. 72-03-00) access panels removed in operation 2.A. (4).

(17) Remove working platform.

(18) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00).

(20) Before next flight operationally test thrust reverser system (Ref. 71-00-00).



1. Connector, downstream pressure sensing to deactivation valve
2. Connector downstream pressure sensing from deactivation valve
3. Connector
4. Connector
5. Nut and bolt

FORWARD

34025

Deactivation valve tubes disconnect points - Engines incorporating S.B.78-3571 and Garrett AiResearch S.B.898330-78-1165
Fig.202

AIR MOTOR - SERVICING

1. Drain Air Motor Oil System

A. Drain Oil System

Referenced Procedures

12-12-71 Thrust Reverser Air Motor Oil Replenishing
72-03-00 Gas Generator Fairings - Removal/Installation
70-30-00 Thrust Reverser - Servicing

(1) Equipment required:

1702170 or 287926-1 Oil drain hose
Clean container - 1 Imp. pint, 1 U.S. pint or 0.5 litre

(2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Lockwire	DTD.189A 22 S.W.G.	- 21 A.W.G.	238

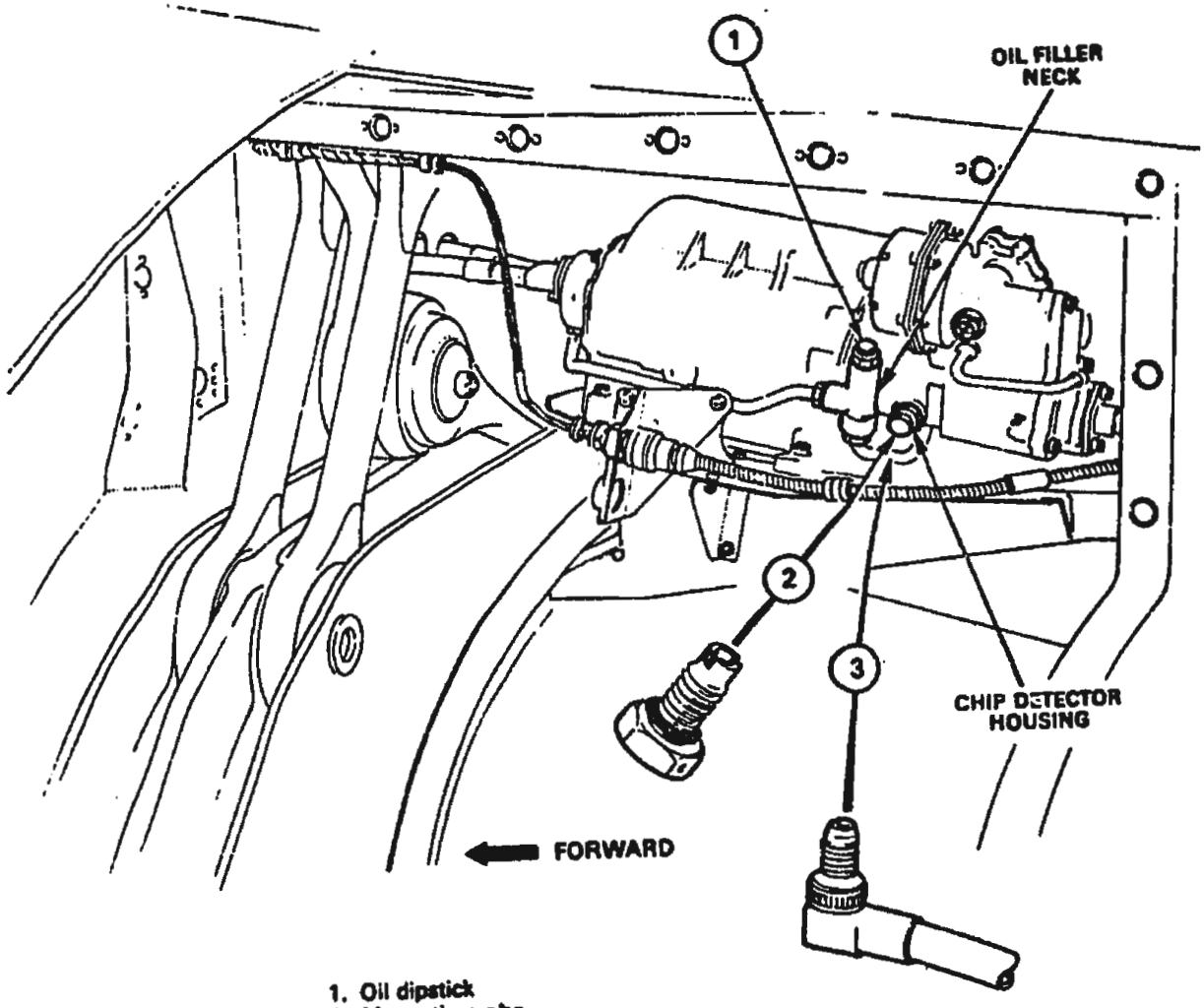
(3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser mechanical locks (Ref. 78-30-00).

(4) Remove pylon L.H. rear access panel (Ref. 72-03-00).

(5) Refer to fig.301 remove dipstick (1) from filler neck by pushing dipstick in and turning anti-clockwise to release.

(6) Remove magnetic probe (2) from chip detector housing.

(7) Screw oil drain hose (3) into chip detector housing; place open end of hose in container.



1. Oil dipstick
2. Magnetic probe
3. Oil drain hose

26513

Air motor oil draining
Fig.301

(8) When draining is complete, remove oil drain hose (3), clean magnetic probe (2), fit and wire lock.

(9) Fit dipstick (1) by pushing down and turning clockwise to lock.

(10) Fit pylon L.H. rear access panel (Ref. 72-03-00).

(11) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00).

Replenishment of air motor oil system is detailed in 12-12-71.

AIR MOTOR - REMOVAL/INSTALLATION

1. Removal/Installation Air Motor

Service Bulletin referred to:

S.B.78-3551 - Introduction of 15 degree afterbody fairings.
S.B.78-2462 - Air Motor re-run retract signal tube.

Referenced Procedures

12-12-71	Air Turbine Motor Oil Replenishing
70-12-02	Fitting Vee Band Coupling Clamps
70-51-00	Torque Tightening Techniques
72-03-00	Gas Generator Fairings - Removal/Installation
78-30-00	Thrust Reverser - Servicing
78-30-00	Thrust Reverser - Adjustment/Test
78-31-08	Translating Cowl Flexible Drive

Illustrated Parts Catalogue References

The I.P.C. sections where parts disturbed during the following operation can be located are as follows:

78-31-03	Air Motor Installation
78-31-04	Air Ducting
78-31-05	Engine Mounted Air Tubes
78-31-40	Power Plant Mounted Air Tubes

CAUTION: THE WEIGHT OF THE AIR MOTOR IS APPROXIMATELY 48.5 LB. (22 KG.).

A. Remove Air Motor

(1) Equipment required:

CP.20726 Sling, air motor
CP.30023/1 Platform
R or
R CP.30205 Platform

(2) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00, Servicing).

(3) Remove pylon L.H. and R.H. rear access panels and interservices L.H. access panel (Ref. 72-03-00).

(4) Refer to fig.401, on engines incorporating S.B.78-3551 remove nuts and bolts (1) and remove detachable leg (2).

(5) Refer to fig.402 (Sheet 1), on engines incorporating S.B.78-2462 disconnect connector (2).

On engines not incorporating S.B.78-2462, disconnect connector 2A.

(6) Remove clip bolt (3) leaving tube clips in position on tubes.

(7) Disconnect flexible drives (4) and (5).

(8) Refer to fig.402 (Sheet 2) disconnect connector (8).

(9) Disconnect tube clip (9) and remove tube (1) (Refer to fig.402 Sheet 1) complete with support clips.

(10) Disconnect connector (11).

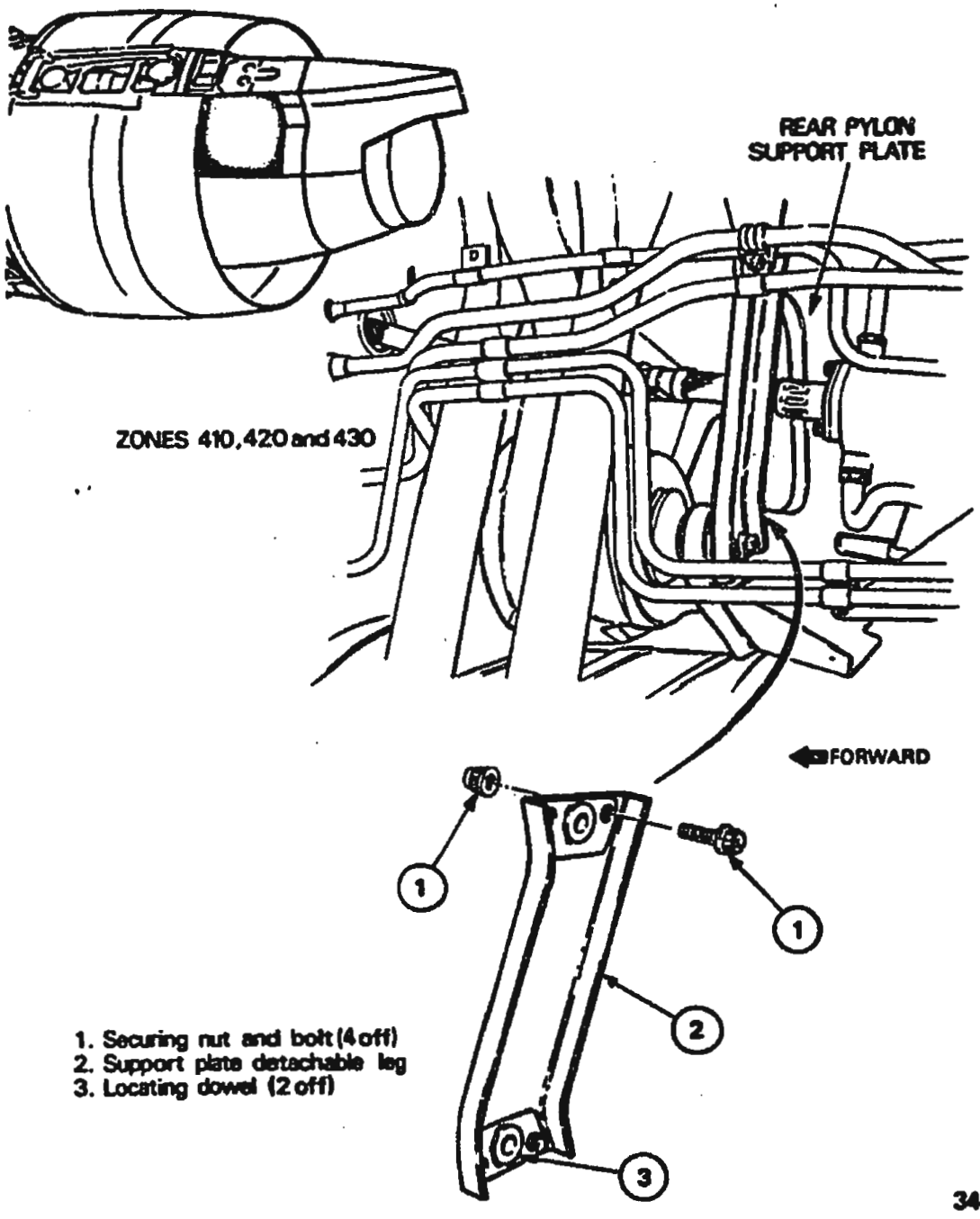
(11) Remove clamp (14) ensuring seal is retained in duct.

(12) Refer to fig.402 (Sheet 1), remove bolts, nuts and washers (7).

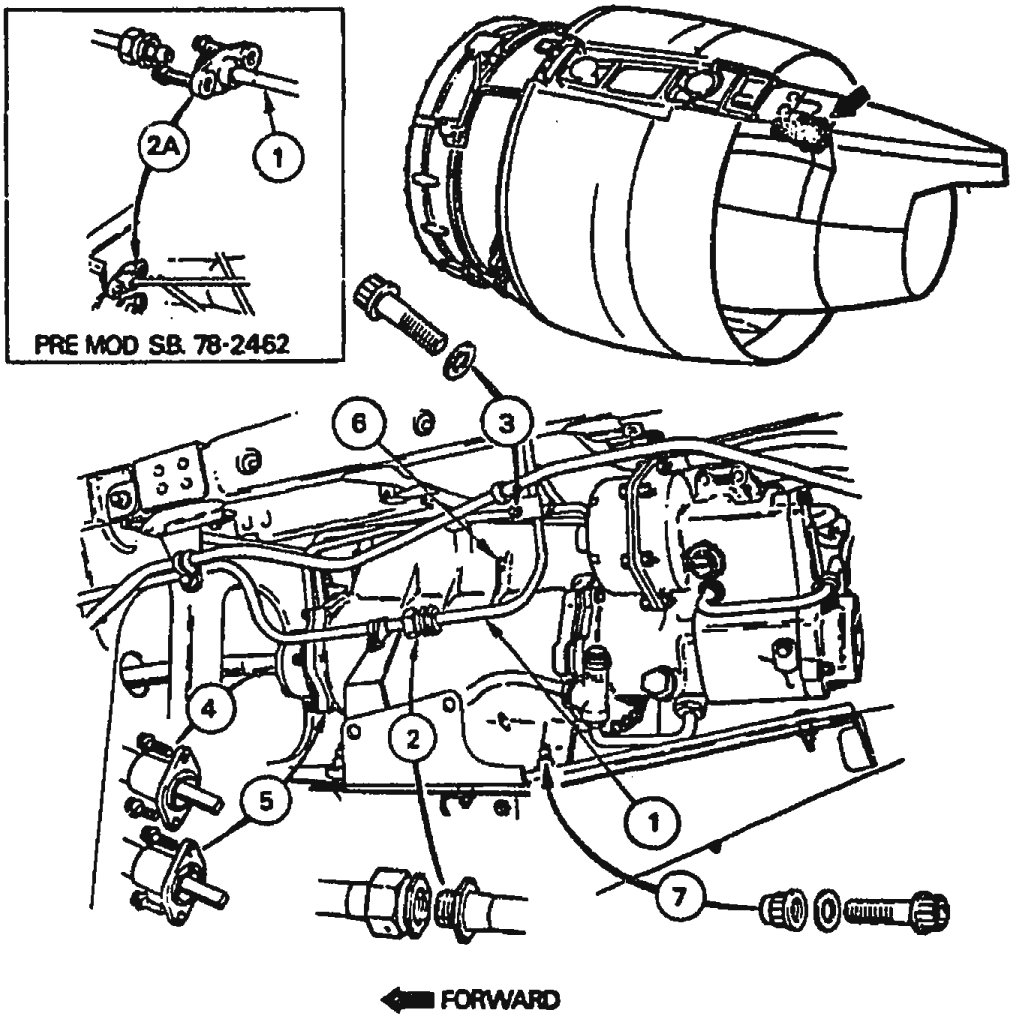
(13) Refer to fig.403, position platform at R.H. pylon fairing access port.

(14) CAUTION: DO NOT HANDLE AIR MOTOR BY AIR TUBES.
Slide air motor from mount (13) on to platform.

(15) CAUTION: FIT SLING TO INTEGRAL SLINGING POINTS (6) ON AIR MOTOR.
Fit sling ensuring attachment legs do not foul air tubes. Remove motor from platform, remove sling.



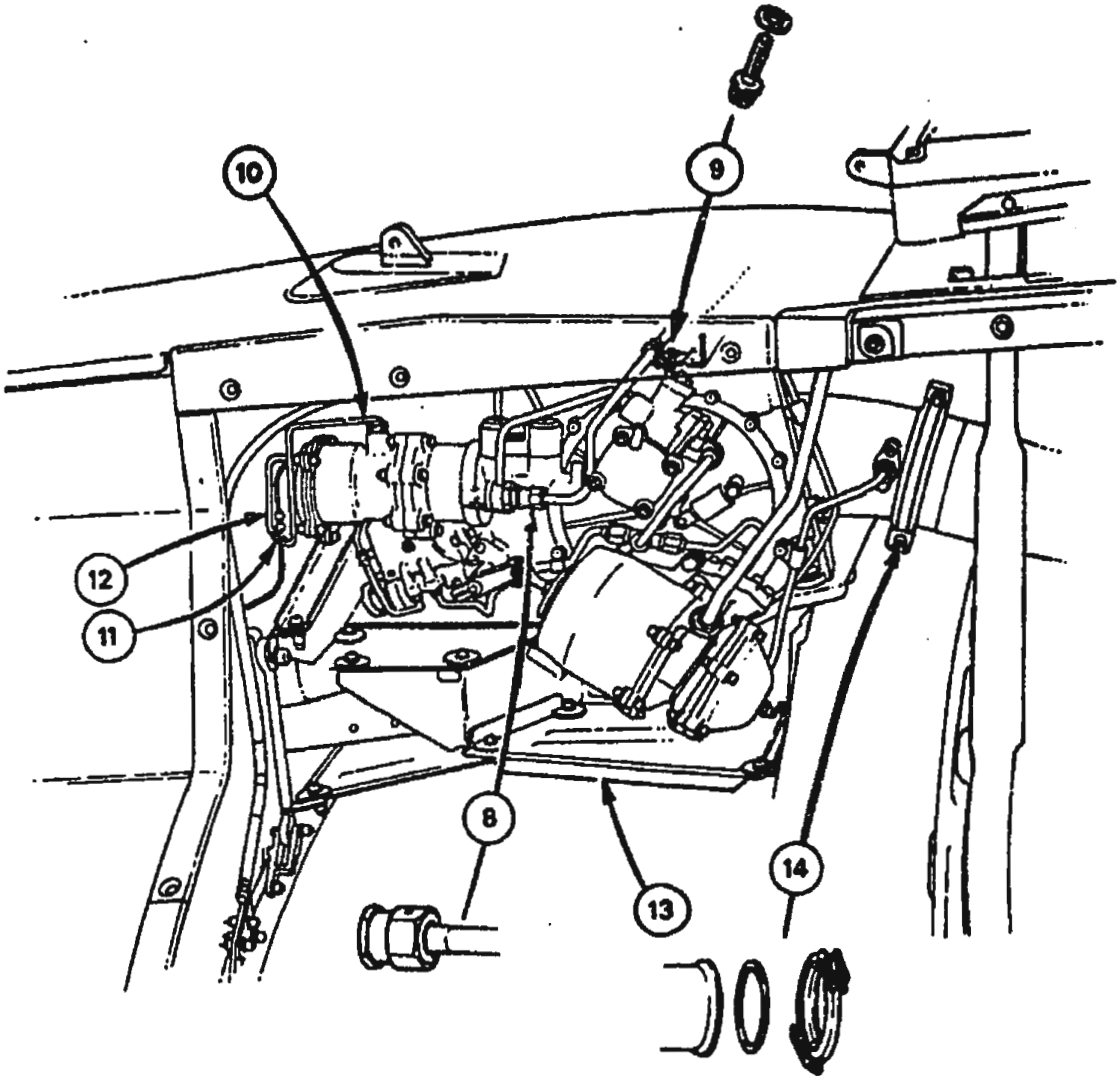
Support plate detachable leg - removal/installation
S.B.78-3551
Fig.401



1 . Tube - retract signal
2 . Connector
2A. Connector
3 . Bolt - tube support clip
4 . Flexible drive - reverser upper right - hand gearbox
5 . Flexible drive - reverser upper left - hand gearbox
6 . Slinging point
7 . Bolt, washer and nut (4 off)

35037

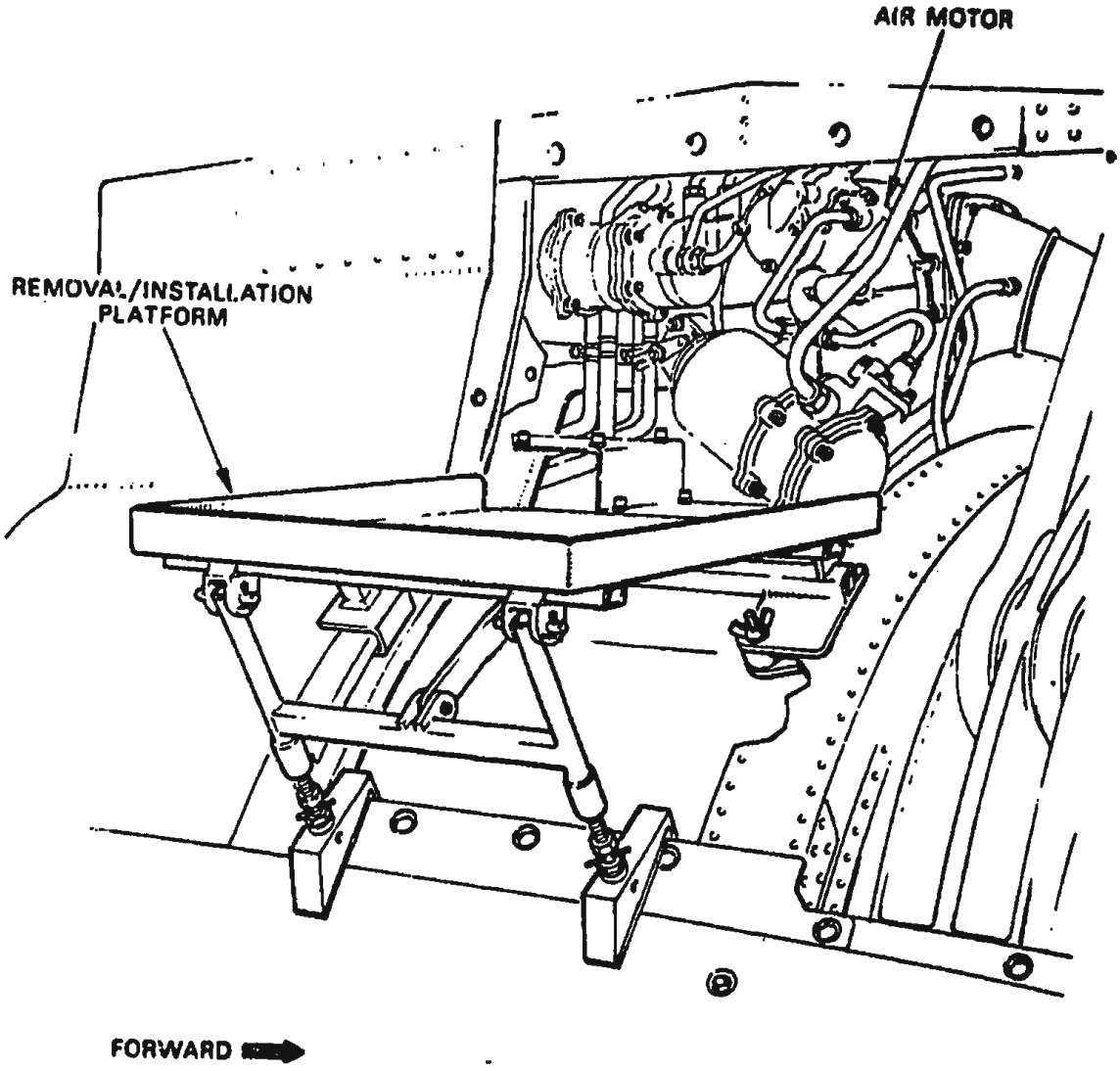
Air motor disconnect points
Fig.402 (Sheet 1)



8. Connector
9. Bolt-tube support clip
10. Tube-extend signal
11. Connector
12. Tube-extend signal
13. Mount
14. Clamp

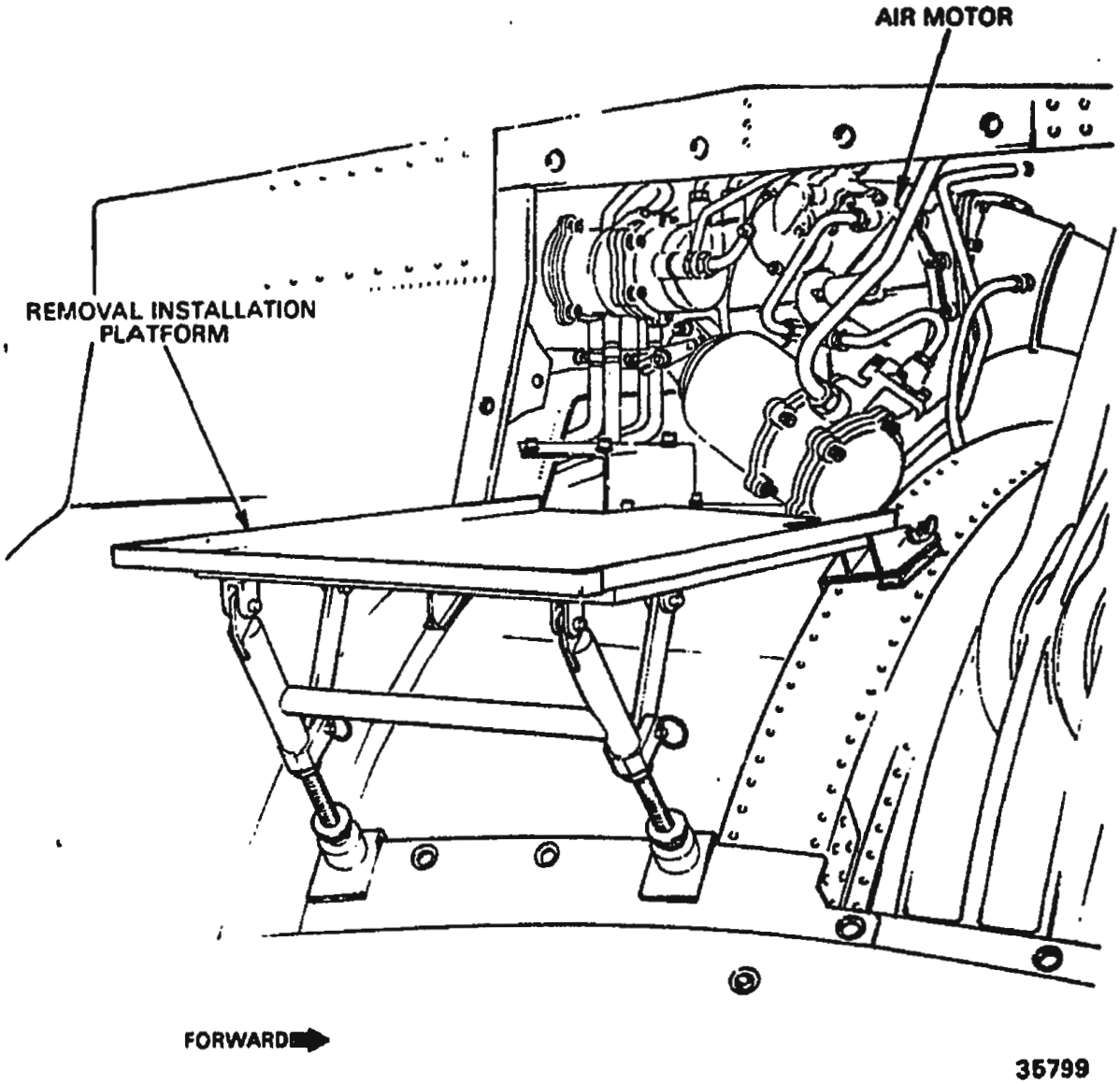
35038

Air motor disconnect points
Fig.402 (Sheet 2)



26982

Air motor removal/installation platform CP.30023/1
Fig.403 (Sheet 1)



Air motor Removal/Installation platform CP.30205
Fig.403 (Sheet 2)

(16) Fit approved blanks to all exposed apertures and connectors.

(17) Remove platform.

B. Install Air Motor

(1) Equipment required:

CP.20726 Sling, air motor
CP.30023/1 Platform
R or
R CP.30205 Platform

(2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Lockwire	DTD.189A 22 S.W.G.	- 21 S.W.G.	238

(3) Ensure thrust reverser is locked and systems are deactivated and tagged as in operation A.(2).

(4) Remove blanks from all apertures and connectors.

(5) Transfer tube (10) to new Air Motor.

(6) Refer to fig.403, ensure platform is in position at R.H. pylon fairing access port.

(7) CAUTION: FIT SLING TO INTEGRAL SLINGING POINTS (6) ON AIR MOTOR.
Fit sling ensuring attachment legs do not foul air tubes. Position motor on platform, remove sling.

(8) Check (Ref. 70-12-02) E-type seal in duct flange.

(9) Refer to fig.402 (Sheet 2) prepare coupling clamp (14) and mating flanges for fitment (Ref. 70-12-02).

(10) CAUTION: DO NOT HANDLE AIR MOTOR BY AIR TUBES.
Slide air motor through R.H. pylon fairing access port and position on mount (13).

(11) Refer to fig.402 (Sheet 1) fit and secure nuts and bolts (7).

(12) Fit and secure (Ref. 70-12-02) coupling clamp (14) (Refer to fig.402 Sheet 2).

(13) Position tube (1). On engines not incorporating S.B.78-2462, connect and secure (Ref. 70-51-00) connectors (2A) and (8) and wire-lock (Refer to fig.402, Sheet 1 and 2).

On engines incorporating S.B.78-2462, connect and secure (Ref. 70-51-00) connectors (2) and (8) and wire-lock (Refer to fig.402, Sheet 1 and 2).

(14) Position tube support clips and fit and secure bolt (3).

(15) Position tube support clips and fit and secure bolt (9).

(16) Connect and secure (Ref. 70-51-00) connector (11) and wire-lock.

(17) Check air motor oil level (Ref. 12-12-71).

(18) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

(19) Set thrust reverser system and functional test (Ref. 78-30-00, Adjustment/Test).

NOTE: The flexible drives (4) and (5) will be connected to the air motor during setting procedure.

(20) On engines incorporating S.B.78-3551, Refer to fig.401, locate detachable leg (2) on dowels and secure with nuts and bolts (1).

(21) Fit pylon L.H. and R.H. rear access panels and interservices L.H. access panel (Ref. 72-03-00).

AIR MOTOR - INSPECTION/CHECK

1. Inspection/Check

A. Check Air Motor Brake Wear

Referenced Procedures

72-03-00 Gas Generator Fairings - Removal/Installation
78-30-00 Thrust Reverser - Servicing
78-31-03 Air Motor - Removal/Installation

(1) Equipment required:

1702231 or 291226-1 Gauge, air motor brake wear

(2) WARNING: ENSURE THRUST REVERSER IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00).

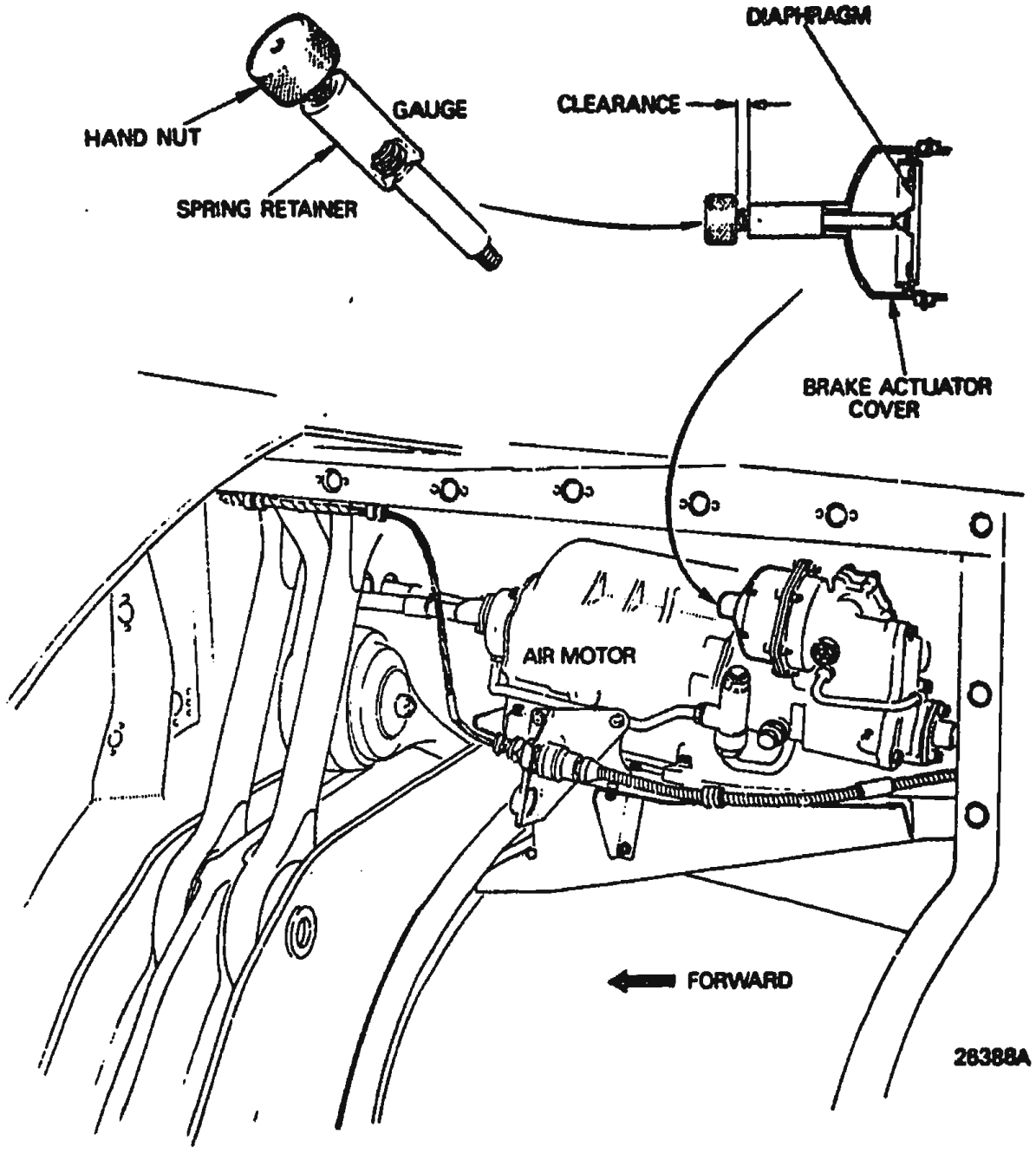
(3) Remove pylon L.H. rear access panel (Ref. 72-03-00).

(4) Refer to fig.601 Insert gauge through brake actuator cover and locate threaded end in diaphragm nut, screw hand nut in as far as possible and check clearance exists between underside of hand nut and upper end of spring retainer. If no clearance exists, replace air motor (Ref. 78-31-03, Removal/Installation).

(5) Remove gauge.

(6) Fit pylon L.H. rear access panel (Ref. 72-03-00).

(7) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00).



Air motor brake wear check
Fig.601

B. Check Air Motor Inlet Pressure

Service Bulletin referred to:

Garrett AiResearch S.B.126348-78-1088 - Introduction of Brake Lock-Out Valve Assembly.

Referenced Procedures

72-03-00 Gas Generator Fairings - Removal/Installation
78-30-00 Thrust Reverser - Adjustment/Test
78-30-00 Thrust Reverser - Servicing

(1) Equipment required:

UT.1102 Pressure check connector or,
UT.1102/1 Pressure check connector (Garrett AiResearch S.B.126348-78-1088)

R A hose and 0-50 p.s.i.g. pressure gauge assembly
R modified to connect to the pressure check connector is
R required to perform this operation.

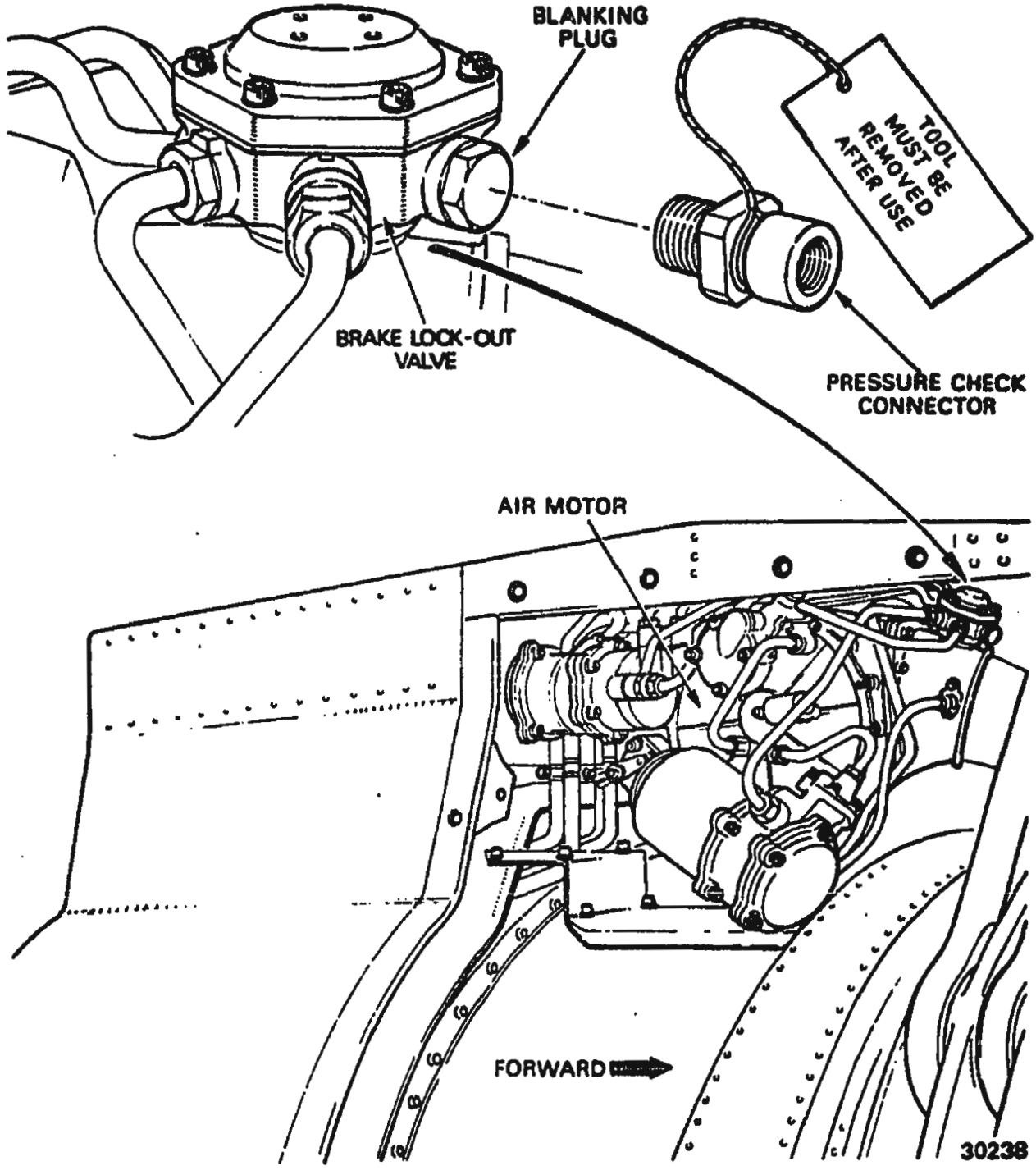
(2) WARNING: ENSURE THRUST REVERSER IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00, Servicing).

(3) Remove pylon R.H. rear access panel (Ref. 72-03-00).

(4) Remove blank from four-way connector located on forward face of air motor and fit UT.1102, pressure check connector. Ensure warning pennant is clearly visible.

On air motors incorporating Garrett AiResearch S.B.126348-78-1088, refer to fig.602, remove blanking plug from brake lock-out valve assembly and fit UT.1102/1, pressure check connector. Ensure warning pennant is clearly visible.

R (5) CAUTION: ENSURE THAT HOSE AND GAUGE ASSEMBLY WILL NOT
R FOUL DURING THRUST REVERSER OPERATION.
R Connect hose and gauge assembly to pressure check
R connector.



Air motor pressure check
Fig.602

(6) Test thrust reverser system (Ref. 78-30-00, Adjustment/Test) and check 15 p.s.i.g. minimum reading
R on pressure gauge.

R (7) Remove hose and pressure gauge assembly. Remove pressure check connector; fit blanking plug.

(8) Fit pylon R.H. rear access panel (Ref. 72-03-00).

(9) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

C. Inspect Air Motor For Overtemperature

Referenced Procedures

72-03-00	Gas Generator Fairings - Removal/Installation
78-30-00	Thrust Reverser - Servicing
78-31-03	Air Motor - Removal/Installation

(1) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00).

(2) Remove pylon fairing L.H. rear access panel (Ref. 72-03-00).

(3) Inspect temperature decal located on side of air motor. If centre of decal has turned black, it is recommended that the air motor is changed (Ref. 78-31-03).

(4) If centre of decal has not turned black, refit pylon fairing L.H. rear access panel (Ref. 72-03-00).

(5) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00).

TRANSLATING COWL - MAINTENANCE PRACTICES

1. Manual Traversing

The following procedure details the method for gaining access to the firewall capping bolts in the event of a thrust reverser system failure that prevents the translating cowl being manually cycled rearwards.

R This procedure also details the method for manually traversing the
R translating cowl in order to investigate and repair a thrust
R reverser which has jammed out of line.

A. Disconnect Translating Cowl

Service Bulletin referred to:

S.B.71-3414 - Inverted Thrust Reverser De-activating Valve.
S.B.78-3795 - Blocker Flaps With Shortened Operating Linkage.
S.B.78-3275 - Translating Cowl Guide Rail Mounting and Nut Housing Shims Revised and Secured.

Referenced procedures:

24-41-00	External Power/Ground Service System - Maintenance Practices
36-11-18	Engine Isolation Valve - Maintenance Practices
71-00-00	Power Plant - Adjustment/Test
71-11-00	Cowling, Engines No.1 and No.3 - Servicing
71-11-01	L.H. Hinged Cowl - Removal/Installation
71-11-02	R.H. Hinged Cowl - Removal/Installation
71-12-05	Cowling Engine No.2 - Servicing and Removal/Installation
71-30-01	Engine Firewall - Removal/Installation
78-30-00	Thrust Reverser - Adjustment/Test
78-31-09	Translating Cowl Flexible Drive, Thrust Reverser Mounted - Removal/Installation
78-31-17	Translating Cowl Gearbox - Removal/Installation
78-31-19	Translating Cowl Screwjack - Maintenance Practices

Illustrated Parts Catalogue references

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

71-11-01	L.H. Hinged Cowl (Engines No.1 and No.3)
71-11-02	R.H. Hinged Cowl (Engines No.1 and No.3)
71-12-05	L.H. and R.H. Upper Hinged Cowl (Engine No.2)
71-30-01	Engine Firewall
78-31-07	Translating Cowl - Panels and Guide Rails
78-31-09	Flexible Drives, Translating Cowl Thrust Reverser Mounted
78-31-17	Translating Cowl Gearboxes
78-31-19	Translating Cowl Screwjacks

(1) Equipment required:

UT.921/2	Collar
3502495	Key pin (S.B.71-3414)

(2) Ensure throttle levers and reverse thrust levers are in forward idle position.

(3) Tag throttle levers, reverse thrust levers and APU/GND AIR REVERSER switches.

(4) Open and tag appropriate THRUST REVERSER circuit breaker (H16, H17 or H18) on pilot's overhead circuit breaker panel CB1, Zone 210.

(5) Open and tag appropriate START AIR VALVE circuit breaker (N3, N9 or N15) on flight engineer's/second officer's aft circuit breaker panel CB3, Zone 215.

(6) Tag appropriate ENGINE START panel switch lights.

(7) On engines not incorporating S.B.71-3414 proceed as follows:

(a) Remove access panel 511LB-3 or 611LB-3 for engine No.1 or No.3 or 471AL for engine No.2.

(b) Manually lock engine isolation valve in closed position (Ref. 36-11-18).

(c) With ground service system energized (Ref. 24-41-04), ensure HI PRESS switch is off (switchlight latched out) and flow bar light is out indicating H.P. shut-off valve is closed.

(d) De-energize ground service system (Ref. 24-41-00).

(e) Open L.H. hinged cowl, 413A or 423A for engine No.1 or No.3 (Ref. 71-11-00) or 433DL for engine No.2 (Ref. 71-12-05, Servicing).

(f) Refer to fig.201, ensure selector valve actuator rod is fully extended (forward thrust position) and position lock collar over actuator rod. Ensure warning pennant is clearly visible.

(8) On engines incorporating S.B.71-3414 proceed as follows:

(a) Refer to fig.202, insert key pin through R.H. cowl and into deactivating valve to isolate reverser from air supply. Ensure key pin is firmly in position and warning pennant is clearly visible.

(b) With ground service energized (Ref. 24-41-00), ensure HI PRESS switch is off (switchlight latched out) and flow bar light is out indicating H.P. shut-off valve is closed.

(c) De-enegize ground service system (Ref. 24-41-00).

(9) Refer to fig.203, release fasteners (1) and remove L.H., R.H. and bottom panel assemblies (2).

R (10) WARNING: IF THE THRUST REVERSER HAS JAMMED OUT OF LINE
R THE TRANSLATING COWL WILL SPRING BACK TO ITS
R NORMAL SHAPE AS MECHANICAL DRIVE HOUSING BOLTS
R ARE REMOVED. PRECAUTIONS MUST BE TAKEN TO
R RESTRAIN THE TRANSLATING COWL AND ALLOW IT TO
R BE RELEASED BACK TO ITS NORMAL SHAPE. FAILURE
R TO RESTRAIN TRANSLATING COWL MAY RESULT IN
R INJURY TO PERSONNEL.

Remove bolts and washers (3) and tri-wing screws (5) attaching mechanical drive housing assembly to translating cowl ring and jury ring assemblies at six positions.

(11) On engines without S.B.78-3275, move translating cowl sufficiently rearwards to permit removal of packer and shims. Identify packer and shims with their relative mechanical drive housing positions for re-installation procedure.

(12) Move translating cowl sufficiently rearwards to permit access to firewall capping bolts.

(13) engines incorporating S.B.71-3414 refer to fig.202, depress key pin centre button and remove pin from deactivation valve.

(14) Remove L.H. and R.H. hinged cowls (Ref. 71-11-01 and 71-11-02 (Engines No.1 or No.3) or 71-12-05 (Engine No.2) Removal/Installation).

(15) Engines incorporating S.B.71-3414 refer to fig.202, re-fit key pin.

R (16) CAUTION: IT IS ESSENTIAL THAT ANY PARTS DISTURBED DURING
R THE FOLLOWING PROCEDURE ARE CORRECTLY INSTALLED
R AND RECONNECTED IN ACCORDANCE WITH THE
R MAINTENANCE MANUAL. FAILURE TO OBSERVE
R MAINTENANCE MANUAL PROCEDURES MAY RESULT IN
R DAMAGE TO THE THRUST REVERSER.

Carry out investigation in order to determine failed unit. Replace failed unit as follows:

Flexible drives (Ref. 78-31-09, Removal/Installation).
Gearboxes (Ref. 78-31-17, Removal/Installation).
Screwjack assemblies (Ref. 78-31-19, Maintenance Practices).

B. Connect Translating Cowl

(1) Ensure circuit breakers are open and systems tagged as detailed in operations A. (3) through (6).

(2) Engines incorporating S.B.71-3414 refer to fig.202, depress key pin centre button and remove pin from deactivation valve.

(3) Fit L.H. and R.H. hinged cowls (Ref. 71-11-01 and 71-11-02 (engine No.1 or No.3) or 71-12-05 (engine No.2), Removal/Installation).

(4) Engines incorporating S.B.71-3414 refer to fig.202, re-fit key pin.

(5) CAUTION: WHEN MOVING TRANSLATING COWL FORWARD, ENSURE TWO UPPER MECHANICAL DRIVE HOUSING ASSEMBLIES PLATES AND PACKING PIECES ARE NOT TRAPPED.
Refer to fig.203, move translating cowl forward until translating cowl ring assembly (4) bolt holes and jury ring (5) bolt holes align with mechanical drive housing assemblies.

(6) On engines without S.B.78-3275, refit packer and shims at original mechanical drive housing positions, then loosely fit bolts and washers (3) and tri-wing screws (5) at six positions to connect housing to translating cowl and jury ring. Finally tighten bolts (3) and screws (5).

(7) Fit L.H. R.H. and bottom panel assemblies (2) and secure fasteners (1).

(8) On engines not incorporating S.B.71-3414 proceed as follows:

(a) Refer to fig.201, remove lock collar from selector valve actuator rod.

(b) Close L.H. hinged cowl, 413A or 423A for engine No.1 or No.3 (Ref. 71-11-00), or 433DL for engine No.2 (Ref. 71-12-05, Servicing).

(c) Unlock engine isolation valve (Ref. 36-11-18).

(d) Fit access panel 511LB-3 or 611LB-3 for engine No.1 or No.3 or 471AL for engine No.2.

(9) Engines incorporating S.B.71-3414 refer to fig.202, depress key pin centre button and remove pin from deactivation valve.

(10) Remove tags and close circuit breakers opened in operations A.(3) through (6).

(11) Manually cycle thrust reverser to forward thrust position (Ref. 78-30-00).

(12) Before next flight, operationally test thrust reverser system (Ref. 71-00-00).

2. Inspection/Check

A. Check Translating Cowl Setting

(1) Equipment required:

UT.924/1 Translating cowl checking gauge

(2) Ensure thrust reverser system is in full forward thrust position.

(3) Tag throttle lever, reverse thrust lever and GND/AIR REVERSER switches.

(4) Open and tag appropriate THRUST REVERSE circuit breaker on pilot's overhead circuit breaker panel CB1, zone 210.

(5) Open and tag appropriate START AIR VALVE circuit breaker on flight engineer/second officer's aft circuit breaker panel CB3, zone 215.

(6) Tag appropriate ENGINE START panel switchlights.

R (7) Refer to fig.204, using checking gauge with standard feeler gauge, check dimension 'B', on both sides, in arc above horizontal centre line, and dimension 'C' in arc between lower screwjacks are within following limits:

'B' - 0.175 to 0.225in. (4,45 to 5,71 mm.)
'C' - 0.225 to 0.275in. (5,71 to 6,99 mm.)

(8) Measure blocker flap droop at centre hinge position.

For acceptance standards see 2.B.

(9) Remove tags and close circuit breakers opened in operations (3) through (6).

B. Acceptance Standards

(1) Translating cowl forward thrust clearance below minimum

(a) Functional test thrust reverser system (Ref. 78-30-00, Adjustment/Test) and re-check clearance (Ref. para.2.A. (7)).

R (b) If outside limits at all positions, set cold stream reverser (Ref. 78-30-00, Adjustment/Test)

(2) Translating cowl forward thrust clearance above maximum - normal acceptance standard

(a) Functional test thrust reverser system (Ref. 78-30-00, Adjustment/Test) and re-check clearance (Ref. para.2.A. (7)).

R (b) If outside limits at all positions, set cold stream reverser (Ref. 78-30-00, Adjustment/Test).

(3) Translating cowl forward thrust clearance above maximum - acceptance standard following use of reverse thrust on landing

(a) If maximum dimensions 'B' and 'C' (Ref. fig.204) do not exceed 0.40in. (10,16 mm.) and 0.45in. (11,43 mm.) respectively at all positions: accept.

(b) With translating cowl within limits (3) (a), blocker flap droop must not exceed 1.0in. (25,4 mm.) on engines without S.B.78-3795 or 0.500in. (12,7 mm.) on engines with S.B.78-3795, at all positions.

(c) If maximum dimensions 'B' and 'C' exceed 0.40in. (10,16 mm.) and 0.45in. (11,43 mm.) at all positions: functional test thrust reverser system (Ref. 78-30-00, Adjustment/Test) and re-check clearances at 'B' and 'C' as detailed in para.2.A.(7).

(d) If clearances still exceed dimensions in para.2. A.(7) set cold stream reverser to original basic settings (Ref. 78-30-00, Adjustment/Test).

3. Translating Cowl - Inspection/Check

A. Inspect Translating Cowl

Referenced Procedures:

78-30-00 - Servicing
78-30-00 - Adjustment/Test

(1) Prepare engine for inspection

(a) Operate thrust reverser system to reverse thrust position (Ref. 78-30-00).

(b) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref. 78-30-00, Servicing).

(c) Remove translating cowl detachable panels, (Ref. fig.205).

(2) Inspection (Ref. fig.205)

(a) Inspect forward diaphragm for circumferential cracks in line with finger brackets and ballscrew housings, especially at front face inner bend radius.

(b) Inspect forward diaphragm for radial cracks.

(c) Inspect forward diaphragm rear face, paying particular attention to the diaphragm inner bend radius for circumferential cracking adjacent to blocker flap finger brackets and ballscrew housing.

(d) Stop drill each end of acceptable cracks using a 0.125in. (3,175 mm.) diameter drill.

(3) Restore engine to flight status

(a) Locate and secure translating cowl detachable panels.

(b) Reactivate and remove tags from thrust reverser and associated systems and remove thrust reverser locks (Ref. 78-30-00).

(c) Operate thrust reverser system to forward thrust position (Ref. 78-30-00).

B. Acceptance Standards (Ref. fig.205)

(1) Circumferential cracks in forward diaphragm inner bend radius:

(a) Cracks up to 3.00in. (76,2 mm.) in length are acceptable provided they are stop drilled at each end.

(b) Cracks in excess of 3.00in. (76,2 mm.) up to a maximum of 4.00in. (101,6 mm.) are acceptable provided the following conditions are met:

(i) The cracks are stop drilled at each end.

(ii) The cracks are inspected at regular intervals to ensure that the 4.00in. (101,6 mm.) limit is not exceeded.

(2) Radial cracks in forward diaphragm.

Radial cracks are not acceptable.

4. Translating Cowl - Cleaning

A. Referenced Procedures

78-30-00 - Servicing

B. Material Required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Degreasing fluid (Inhibited and Stabilized 1.1.1. trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21

C. Ensure throttle levers and reverse thrust levers are in forward idle position.

D. Tag throttle levers, reverse thrust levers and APU/GND AIR REVERSER switches.

E. Open and tag appropriate THRUST REVERSER circuit breaker (H16, H17 or H18) on pilots overheat circuit breaker panel CB1, Zone 210.

F. Open and tag appropriate START AIR VALVE circuit breaker (N3, NG or N15) on flight enginners/second officers aft circuit breaker panel CB3, Zone 215.

G. Tag appropriate ENGINE START panel switch lights.

H. Manually crank (Ref. 78-30-00) thrust reverser to fully deployed position.

I. Cleaning procedure

(1) WARNING: WHEN USING DEGREASING FLUID ENSURE ADEQUATE VENTILATION AND AVOID SKIN CONTACT AND INHALING THE VAPOUR.

Using degreasing fluid clean the following:

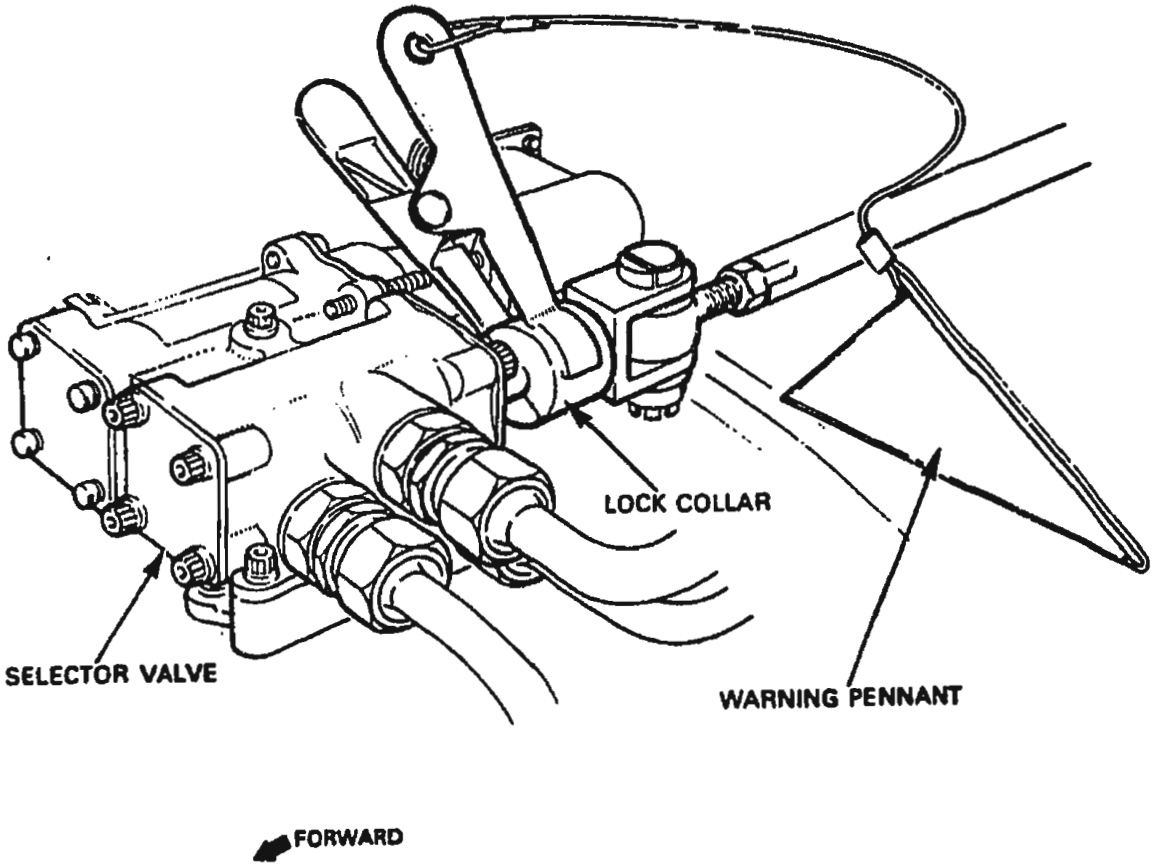
(a) Translating cowl rubbing blocks and cowl inner skin, ensure surfaces are wiped dry.

(b) All accessible surfaces on extension nozzle and cold nozzle, ensure surfaces are wiped dry.

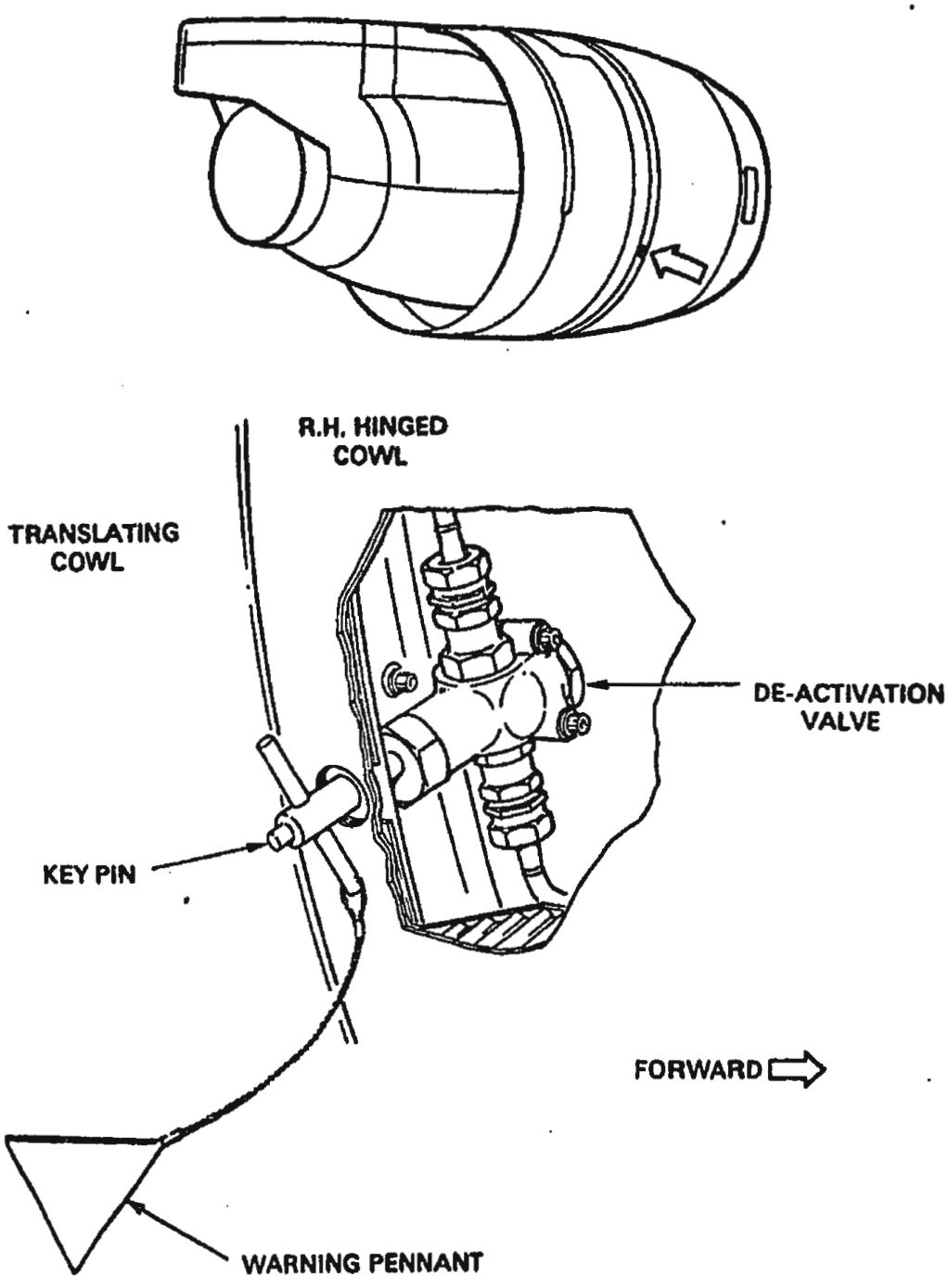
(2) Slowly translate cowl to fully stowed position, repeat cleaning operations as necessary to achieve clean dry surfaces on extension nozzle and cold nozzle.

J. Restore engine to flight status.

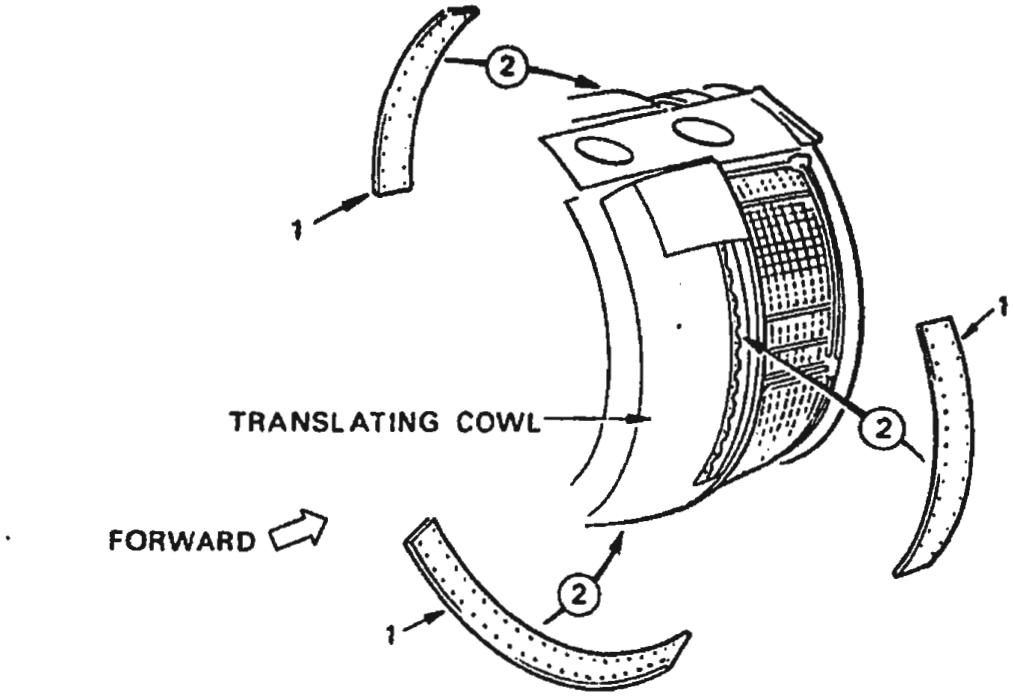
(1) Remove tags and close circuit breakers opened in operation C.(2) to (5).

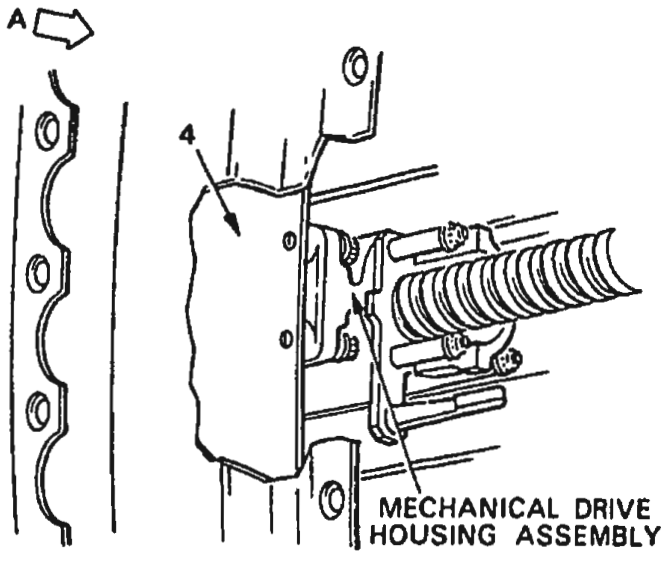


Thrust reverser ground lock (Pre S.B.71-3414)
Fig.201

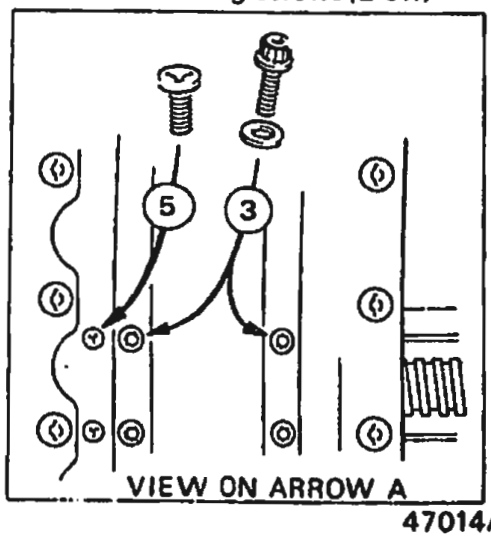


Thrust reverser system deactivation (S.B.71-3414)
Fig.202



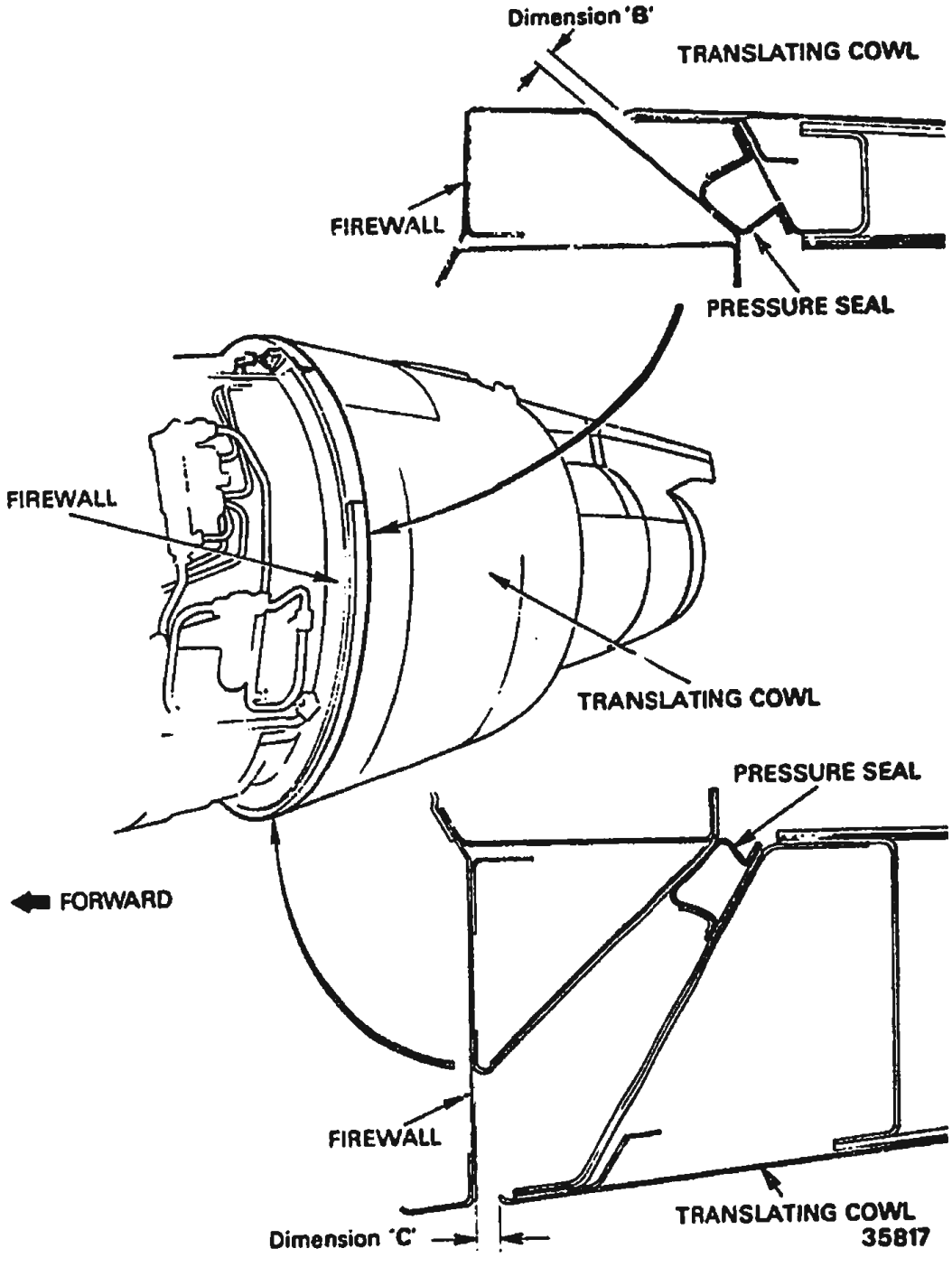


1 Fasteners (121 off)
2 Panel assemblies (3 off)
3 Bolt and washer (4 off)
4 Translating cowl ring assembly
5 Tri-wing screws (2 off)

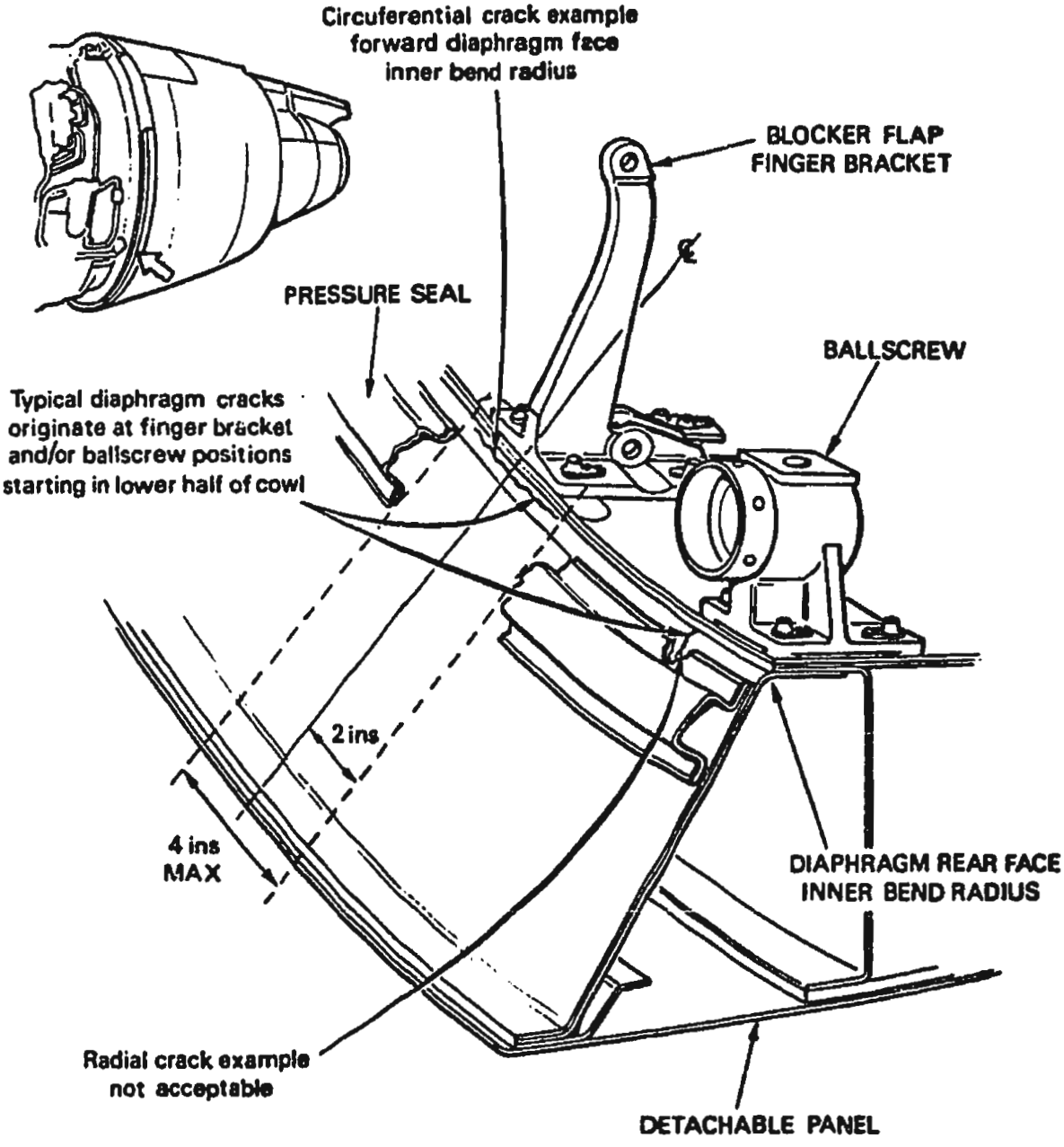


47014A

R Mechanical drive housing and translating cowl
R ring assemblies disconnect points
R Fig.203



Translating cowl checking positions
Fig.204



Translating Cowl Front Diaphragm - Inspection/Check
Fig.205

R # TRANSLATING COWL - APPROVED REPAIRS

R ## REPAIR CRACKING IN COWL FAIRING BY PATCHING

R ## FRS.3603

R 1. Effectivity

R	I.P.C. Fig./Item	Part No.	
R	01 200	LJ.24768	
R		LJ.27743	S.B.78-4078

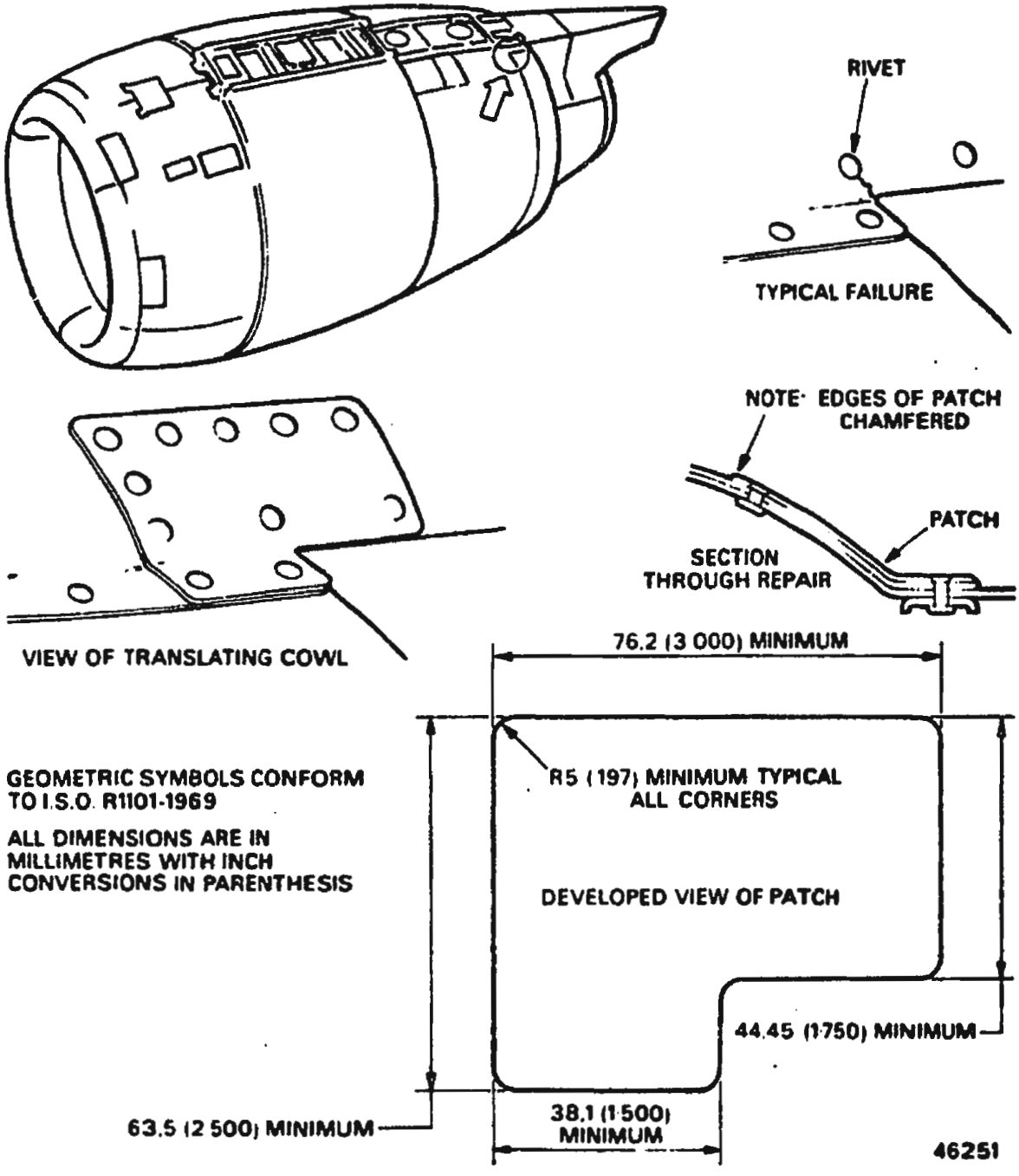
R 2. General

R Cracks in the skin terminating in a rivet hole or at the skin
R edge do not require preparation. All other cracks must be
R stop drilled.

R 3. Instructions

R A. Apply patch

R	Procedure	Supplementary information
R	(1) Cut and form the patch as shown in fig.801.	Use material of same gauge as original skin
R	(2) Drill and countersink the patch as shown in fig.801. 4D nominal	Rivet spacing D = the rivet diameter used



GEOMETRIC SYMBOLS CONFORM TO I.S.O. R1101-1969

ALL DIMENSIONS ARE IN MILLIMETRES WITH INCH CONVERSIONS IN PARENTHESIS

Repair Details
Fig.801

EFFECTIVITY: ALL

TRANSLATING COWL FLEXIBLE DRIVES, ENGINE MOUNTED - REMOVAL/INSTALLATION

The Removal/Installation procedures detailed in this section are as follows:

Paragraph	Procedure
1.	Removal/Installation Translating Cowl Flexible Drives, Engine Mounted
A.	Remove Flexible Drive Assembly
B.	Install Flexible Drive Assembly
2.	Removal/Installation Translating Cowl Flexible Drive core, Engine Mounted
A.	Remove Flexible Drive Cores
B.	Install Flexible Drive Cores

1. Removal/Installation Translating Cowl Flexible Drives, Engine Mounted

CAUTION: 1. IF BOTH FLEXIBLE DRIVE ASSEMBLIES ARE REMOVED THE COLD STREAM REVERSER MUST BE SET (REF. 78-30-00, ADJUSTMENT/TEST) FOLLOWING INSTALLATION OF DRIVE ASSEMBLIES.

2. DO NOT COIL FLEXIBLE DRIVES ASSEMBLIES.

Referenced Procedures:

C

71-00-00	Power Plant - Adjustment/Test
72-03-00	Gas Generator Fairings - Removal/Installation
78-30-00	Thrust Reverser - Servicing
78-30-00	Thrust Reverser - Adjustment/Test

Service Bulletins referred to:

S.B.71-4450 - Thrust Reverser Front Hoop Plate Sidewalls with Improved Flexible Drive Fairleads
S.B.78-3302 - Modified Clamps and Attachments with Clearance Bushes in Rear Clamps
S.B.78-3551 - Introduction of 15 Degree Afterbody
S.B.78-4639 - Flexible Drives, Translating Cowl Engine Mounted - Introduction of Quick-release Clipping
Garrett AiResearch S.B.121388-78-1267 (R.R.S.B.78-4714) - Thrust Reverser System - Introduction of Alternate Flexible Shaft Assembly - this S.B. is referred to in following procedure by the R.R.S.B.78-4714.

Illustrated Parts Catalogue References:

72-03-04 Engine/Power Plant Interservices Section
78-31-08 Translating Cowl Flexible Drives, Engine Mounted

A. Remove Flexible Drive Assembly

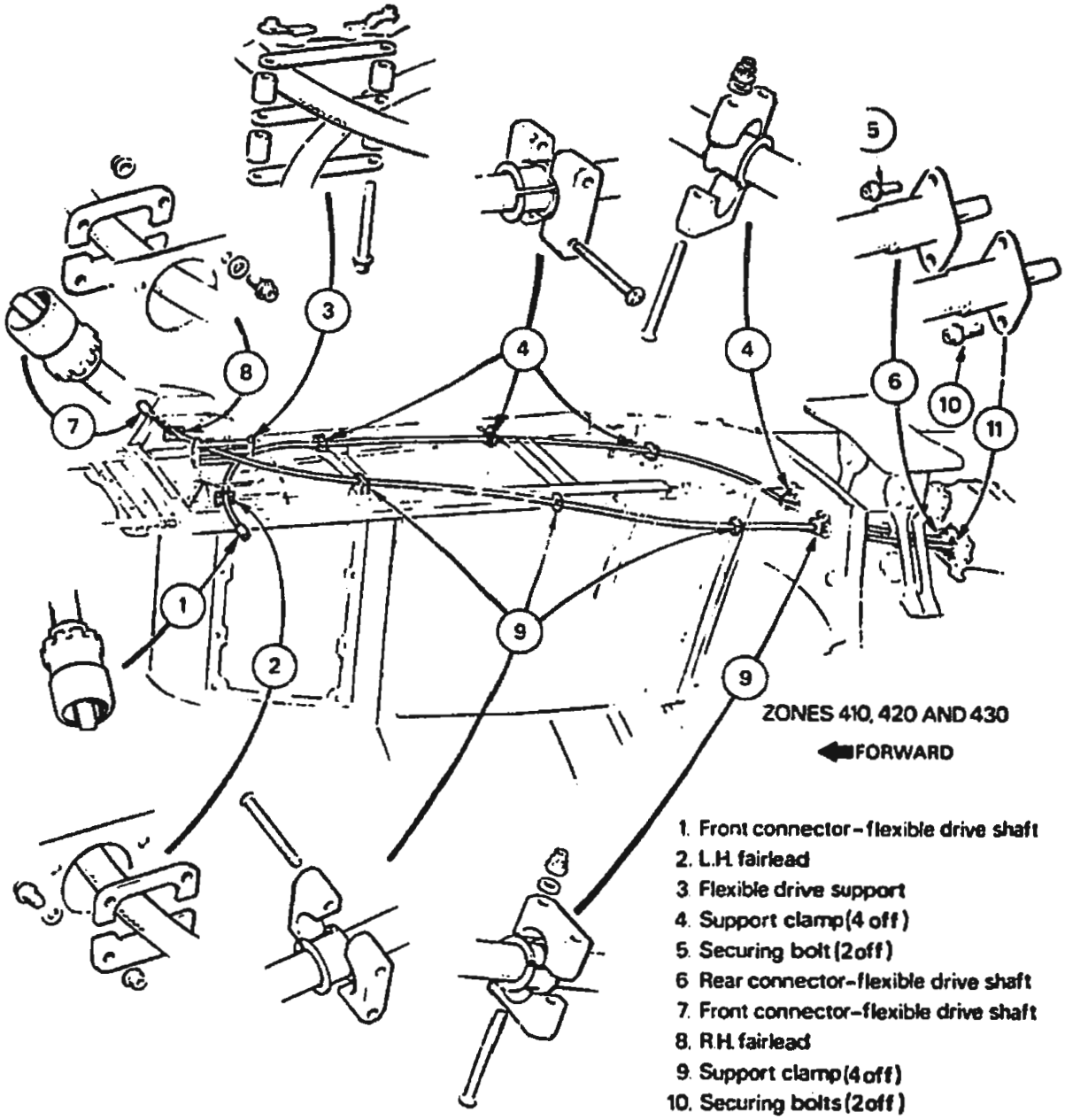
(1) Equipment required:

HU.20163/1	Socket spanner
CP.20309 or XUT.37594	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece

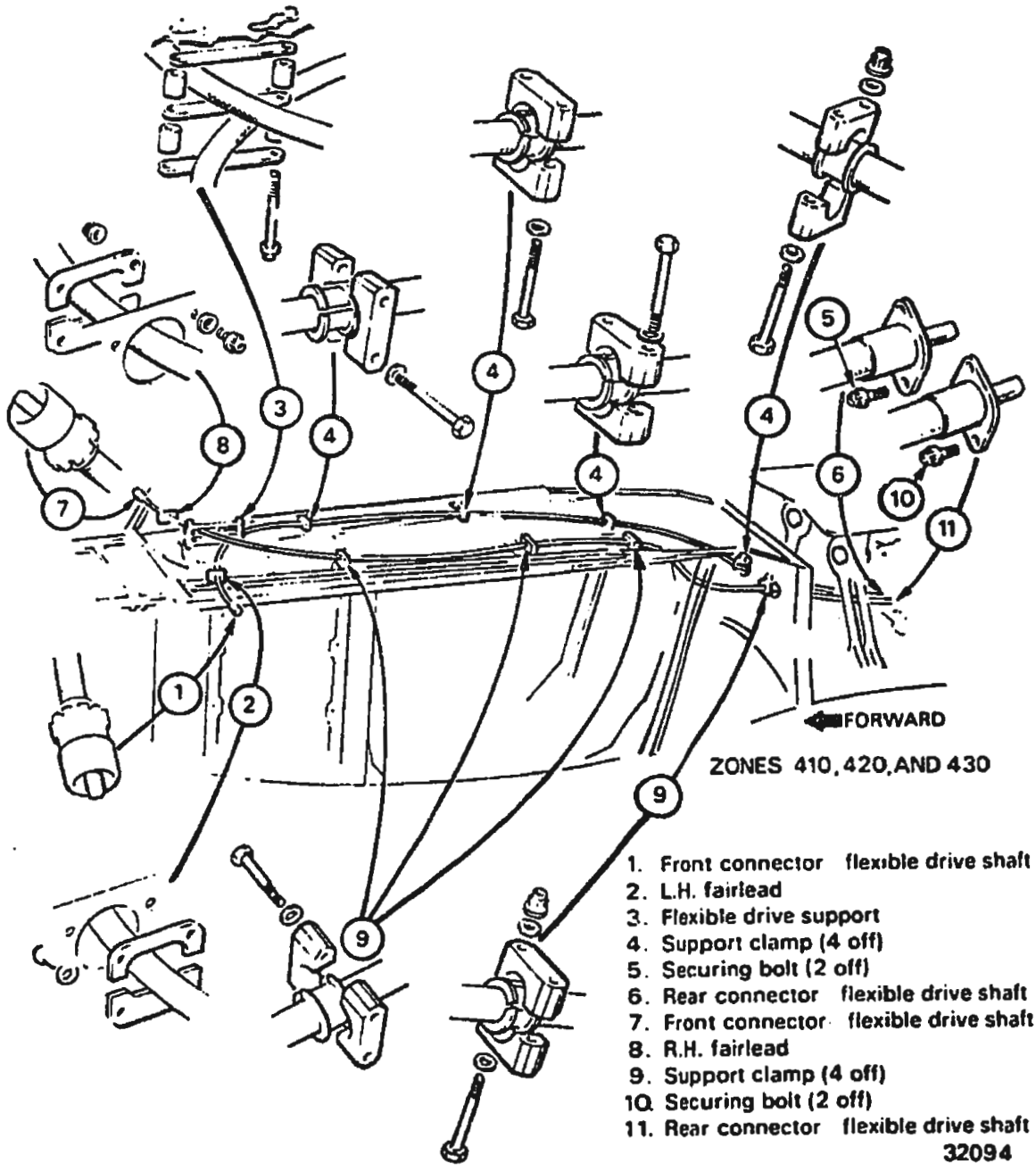
(2) CAUTION: ENSURE THRUST REVERSER IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00, Servicing).

(3) Remove flexible drive assembly, air motor R.H. output drive pad to L.H. upper gearbox.

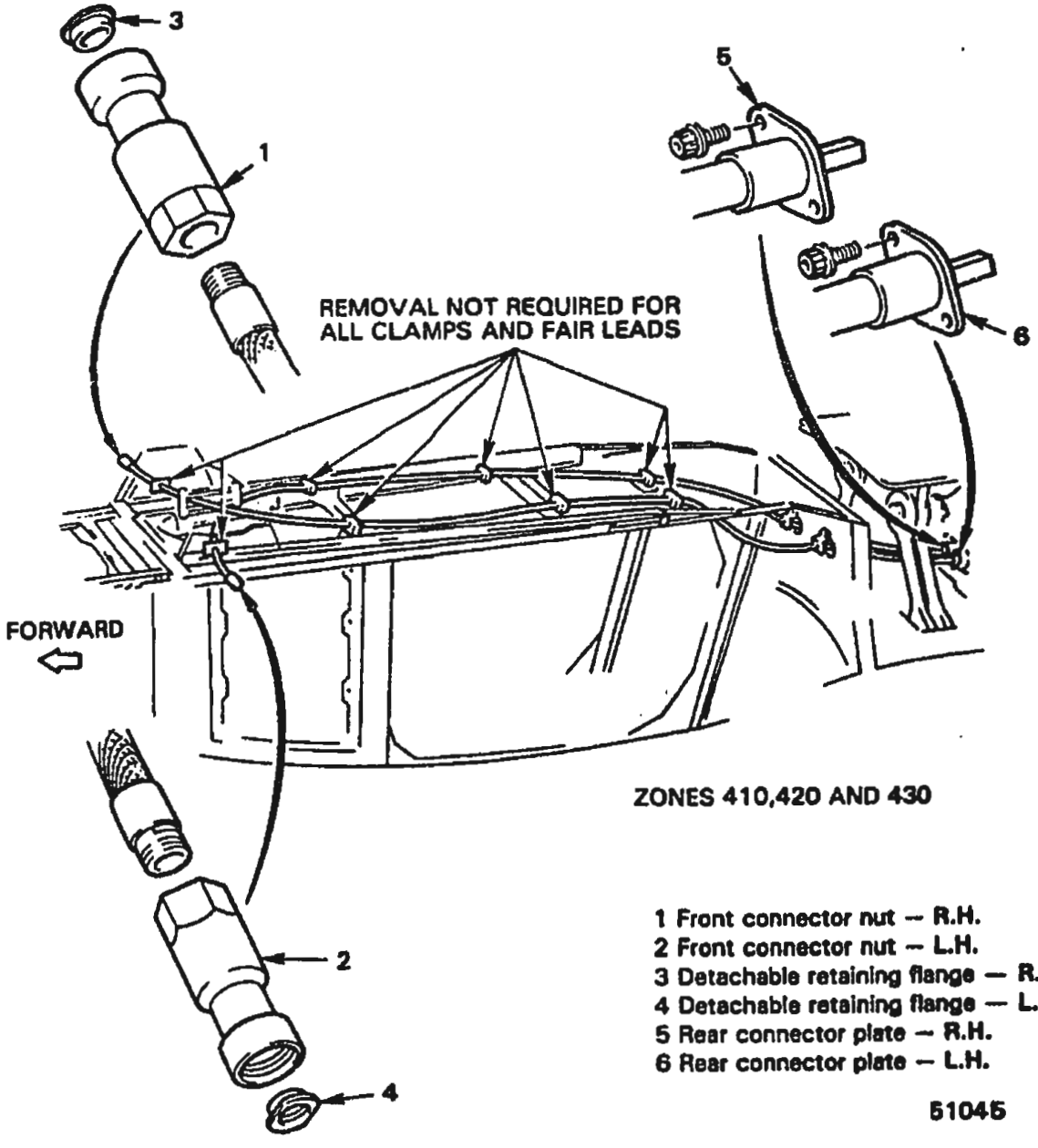
(a) Position working platform in cold stream duct.


ZONES 410, 420 AND 430
FORWARD
1. Front connector-flexible drive shaft
2. L.H. fairlead
3. Flexible drive support
4. Support clamp (4 off)
5. Securing bolt (2 off)
6. Rear connector-flexible drive shaft
7. Front connector-flexible drive shaft
8. R.H. fairlead
9. Support clamp (4 off)
10. Securing bolts (2 off)
11. Rear connector-flexible drive shaft
257898

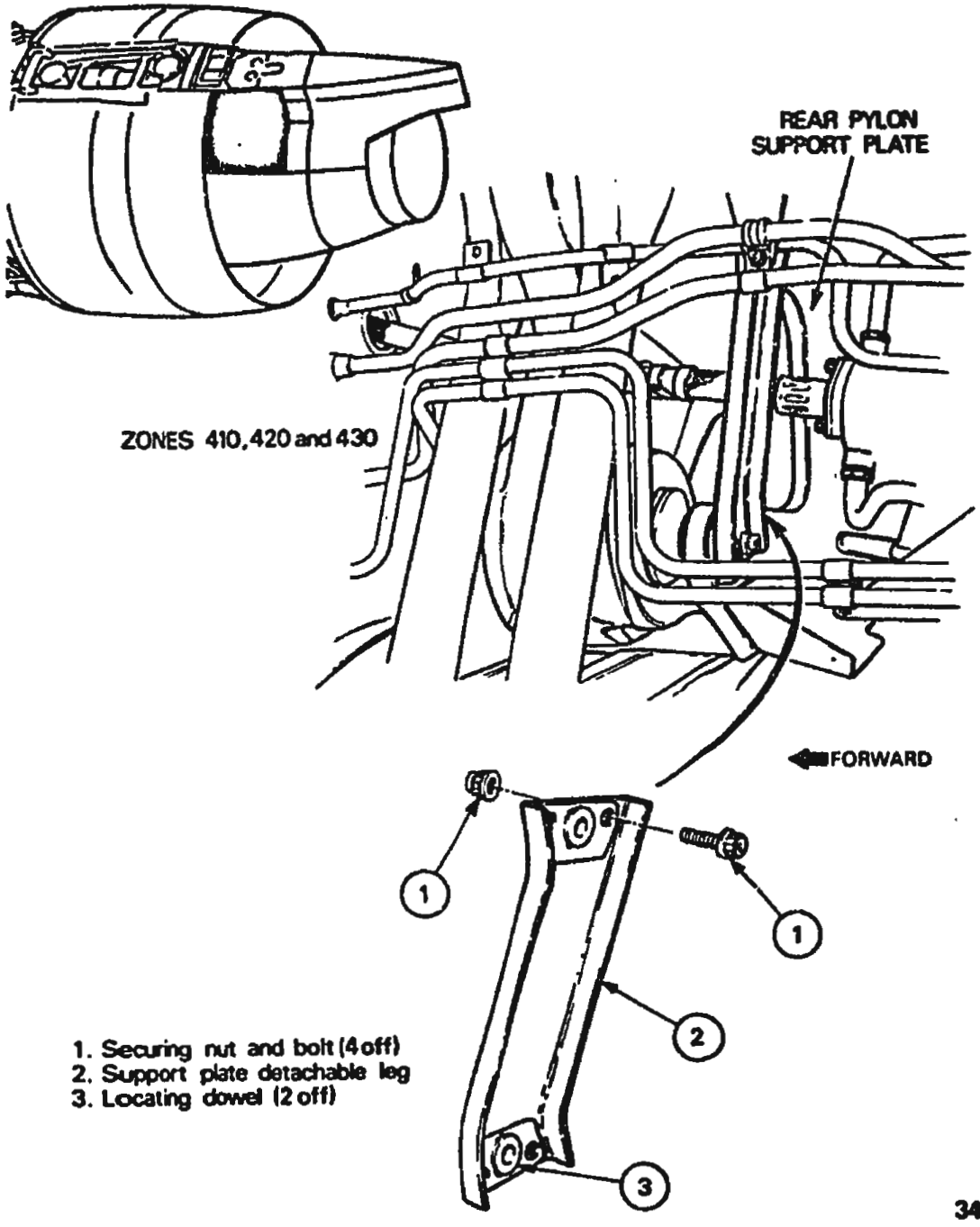
Engine mounted flexible drive disconnect points
(Pre S.B.71-4450, S.B.78-3302, S.B.78-4639 and S.B.78-4714)
Fig.401 (Sheet 1)


FORWARD
ZONES 410, 420, AND 430
1. Front connector flexible drive shaft
2. L.H. fairlead
3. Flexible drive support
4. Support clamp (4 off)
5. Securing bolt (2 off)
6. Rear connector flexible drive shaft
7. Front connector flexible drive shaft
8. R.H. fairlead
9. Support clamp (4 off)
10. Securing bolt (2 off)
11. Rear connector flexible drive shaft
32094

Engine mounted flexible drive disconnect points
(Pre S.B.71-4450, S.B.78-3302, S.B.78-4639 and S.B.78-4714)
Fig.401 (Sheet 2)



CR Engine mounted flexible drive disconnect points
CR (M.O. 95826)
CR Fig.401 (Sheet 3)



Support plate detachable leg - removal/installation
(S.B.78-3551)
Fig.402

(b) Enter cold stream duct and remove following access panels from interservices fairing (Ref. 72-03-00):

Engines No.1 and 3

I.P./H.P. Duct L.H. (418AL or 428AL) and R.H. (418AR or 428AR) Access Panel.
Interservices Fairing R.H. Access Panel 418BR or 428BR.
Pylon Fairing Upper R.H. Access Panel 418CR or 428CR.
Air Motor R.H. Access Panel 418DR or 428DR.

Engine No.2

I.P./H.P. Duct L.H. (438AL) and R.H. (438AR) Access Panel.
Interservices Fairing R.H. Access Panel 438BR.
Pylon Fairing Upper R.H. Access Panel 438CR.
Air Motor R.H. Access Panel 438DR.

C (c) Deleted.

C (d) Refer to fig.401 (Sheet 1 or 2), using socket
C spanner, disconnect connector (1) from L.H. upper
C gearbox. If M.O. 95826 is done - use open end
C wrench on connector.

C (e) Remove L.H. fairlead (2), flexible drive support
C (3) and separate L.H. and R.H. flexible drive
C assemblies. If M.O. 95826 is done - do not
C remove fairlead.

C (f) Remove clamps (4). If M.O. 95826 is done - do
C not remove or loosen clamps.

C (g) Remove bolts (5) from rear connector (6) and
C remove connector.

C (h) Remove flexible drive assembly from interservices
C fairing. If M.O. 95826 is done - remove
C detachable retaining flange at the forward end
C of the cable housing and slip off connector nut.
C Remove drive housing assembly by pulling through
C clamps from aft end.

C (j) Deleted.

C (k) Deleted.

(4) Remove flexible drive assembly, air motor L.H. output drive pad to R.H. upper gearbox.

(a) Position working platform in cold stream duct.

(b) Enter cold stream duct and remove following access panels from interservices fairing (Ref. 72-03-00):

Engines No.1 and 3

I.P./H.P. Duct L.H. (418AL or 428AL) and R.H. (418AR or 428AR) Access Panel.
Interservices Fairing L.H. Access Panel 418BL or 428BL.
Pylon Fairing Upper L.H. Access Panel 418CL or 428CL.
Air Motor L.H. Access Panel 418DL or 428DL.

Engine No.2

I.P./H.P. Duct L.H. (438AL) and R.H. (438AR) Access Panel.
Interservices Fairing L.H. Access Panel 438DL.
Pylon Fairing Upper L.H. Access Panel 438CL.
Air Motor L.H. Access Panel 438DL.

C (c) Deleted

C (d) Refer to fig.401 (Sheet 1 or 2), using socket
C spanner, disconnect connector (7) from R.H.
C upper gearbox. If M.O. 95826 is done - use
C open end wrench on connector.

C (e) Remove R.H. fairlead (8), flexible drive support
C (3) and separate L.H. and R.H. flexible drives.
C If M.O. 95826 is done - do not remove fairlead.

C (f) Remove clamps (9). If M.O. 95826 is done -
C do not remove or loosen clamps.

C (g) Remove bolts (10) from rear connector (11) and
C remove connector.

C (h) Remove flexible drive assembly from interservices
C fairing. If M.O. 95826 is done - remove
C detachable retaining flange at the forward end
C of the cable housing and slip off connector nut.
C Remove drive housing assembly by pulling through
C clamps from aft end.

C (j) Deleted.

C (k) Deleted

B. Install Flexible Drive Assembly

NOTE: Flexible drive outer casings may contract during storage, therefore, casings should be stretched using a 30 to 40 lb. load before installation.

(1) Equipment required:

HU20163/1	Socket spanner
CP20309 or XUT37594	Working platform
or (XUT42526	Spacer
(XUT42527	Side piece

C (2) Ensure thrust reverser is locked and associated systems are deactivated as detailed in operation A.(2).

C (3) Install flexible drive assembly, air motor R.H. output drive pad to L.H. upper gearbox.

CAUTION: ENSURE FLEXIBLE DRIVE ASSEMBLY FROM R.H. OUTPUT DRIVE PAD OF AIR MOTOR CONNECTS TO L.H. UPPER GEARBOX

(a) Ensure working platform is in position in cold stream duct.

C (b) Position flexible drive assembly in interservices fairing, ensuring assembly passes through R.H. hole in rear mount and interservices rear C diaphragm, and through L.H. sidewall of hoop C plate, front section. If M.O. 95826 is done - C remove detachable retaining flange and connector C nut. Thread cable through clamps starting at C rear mount and working forward. Slip connector C nut over forward end of cable and install C detachable retaining flange - torque to 100 lbs.in.

C (c) Refer to fig.401 (Sheet 1 or 2), using socket C spanner connect and secure connector (1) to L.H. C gearbox. Toruqe tighten to 40-50 lb.in. If C M.O. 95826 is done - use open end wrench to secure C connector to L.H. gearbox.

C (d) Position rear connector (6) on air motor R.H. C output drive pad, fit and secure bolts (5), torque C tighten to 25-30 lb.in.

C (e) Fit clamps (4). If M.O. 95826 is done - step C is not required.

C (f) Position L.H. and R.H. flexible drive assemblies C and fit flexible drive support (3). If M.O. C 95826 is done - step is not required.

C (g) Fit L.H. fairlead (2). If M.O. 95826 is done - C step is not required.

C (h) Deleted.

C (j) Fit following access panels to interservices fairing (Ref. 72-03-00):

Engines No.1 and 3

I.P./H.P. Duct L.H. (418AL or 428AL) and R.H. (418AR or 428AR) Access Panel.
Interservices Fairing R.H. Access Panel 418BR or 428BR.
Pylon Fairing Upper R.H. Access Panel 418CR or 428CR.
Air Motor R.H. Access Panel 418DR or 428DR.

Engine No.2

I.P./H.P. Duct L.H. (438AL) and R.H. (438AR) Access Panel.
Interservices Fairing R.H. Access Panel 438BR.
Pylon Fairing Upper R.H. Access Panel 438CR.
Air Motor R.H. Access Panel 438DR.

C (k) Remove working platform.

C (4) Install flexible drive assembly, air motor L.H. output drive pad to R.H. upper gearbox.

CAUTION: ENSURE FLEXIBLE DRIVE ASSEMBLY FROM L.H. OUTPUT DRIVE PAD OF AIR MOTOR CONNECTS TO R.H. UPPER GEARBOX.

(a) Ensure working platform is in position in cold stream duct.

C (b) Position flexible drive assembly in interservices fairing ensuring assembly passes through L.H. hole in rear mount and interservices rear diaphragm, and R.H. sidewall of hoop plate, front section.

C If M.O. 95826 is done - remove detachable
C retaining flange and connector nut. Thread
C cable through clamps starting at rear mount and
C working forward. Slip connector nut over forward
C end of cable and install detachable retaining
C flange - torque to 100 lbs.in.

C (c) Refer to fig.401 (Sheet 1 or 2), using socket
C spanner connect and secure connector (7) to R.H.
C gearbox. Torque tighten to 40-50 lb.in. If
C M.O. 95826 is done - use open end wrench.

C (d) Position rear connector (11) on air motor L.H.
C ouptut drive pad, fit and secure bolts (10),
C torque tighten to 25-30 lb.in.

C (e) Fit clamps (9). If M.O. 95826 is done - steps
C are not required.

C (f) Position L.H. and R.H. flexible drive assemblies
C and fit flexible drive support (3). If M.O.
C 95826 is done - steps are not required.

C (g) Fit R.H. fairlead (8). If M.O. 95826 is done -
C steps are not required.

C (h) Deleted

C (j) Fit following access panels to interservices fairing (Ref. 72-03-00):

Engines No.1 and 3

I.P./H.P. Duct L.H. (418AL or 428AL) and R.H. (418AR or 428AR) Access Panel.
Interservices Fairing L.H. Access Panel 418BL or 428BL.
Pylon Fairing Upper L.H. Access Panel 418CL or 428CL.
Air Motor L.H. Access Panel 418DL or 428DL.

Engine No.2

I.P./H.P. Duct L.H. (438AL) and R.H. (438AR) Access Panel.
Interservices Fairing L.H. Access Panel 438DL.
Pylon Fairing Upper L.H. Access Panel 438CL.
Air Motor L.H. Access Panel 438DL.

C (k) Remove working platform.

C (5) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

C (6) Before next flight, operationally test thrust reverser system (Ref. 71-00-00).

2. Removal/Installation Translating Cowl Flexible Drive Core, Engine Mounted

CAUTION: IF BOTH FLEXIBLE DRIVE CORES ARE REMOVED, THE COLD STREAM REVERSER MUST BE SET (REF. 78-30-00, ADJUSTMENT/TEST) FOLLOWING INSTALLATION OF DRIVE CORES.

Referenced Procedures:

	71-00-00	Thrust Reverser - Adjustment/Test
	72-03-00	Gas Generator Fairings - Removal/Installation
	78-30-00	Thrust Reverser - Servicing
	78-30-00	Thrust Reverser - Adjustment/Test
R	12-21-31	Exhaust System Lubrication - Servicing

Service Bulletin referred to:

S.B.78-3302 - Modified Clamps and Attachments with Clearance Bushes in Rear Clamps
S.B.78-3551 - Introduction of 15 Degree Afterbody
S.B.78-4639 - Flexible Drives, Translating Cowl Engine Mounted Introduction of Quick-release Clipping

Illustrated Parts Catalogue References:

72-03-04	Engine/Power Plant Interservices Section
78-31-08	Flexible Drives, Translating Cowl - Engine Mounted.

A. Remove Flexible Drive Cores

(1) Equipment required:

CP.20309 or XUT.37594	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece

(2) CAUTION: ENSURE THRUST REVERSER IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00, Servicing).

(3) Remove flexible drive core, air motor R.H. output drive pad to L.H. upper gearbox - engines not incorporating S.B.78-3302.

(a) Position working platform in cold stream duct.

(b) Enter cold stream duct and remove following access panels from interservices fairing (Ref. 72-03-00):

Engines No.1 and 3

Interservices Fairing R.H. Access Panel 418BR or 428BR.
Pylon Fairing Upper R.H. Access Panel 418CR or 428CR.
Air Motor R.H. Access Panel 418DR or 428DR.

Engine No.2

Interservices Fairing R.H. Access Panel 438BR.
Pylon Fairing Upper R.H. Access Panel 438CR
Air Motor R.H. Access Panel 438DR.

C (c) Deleted

C (d) Refer to fig.401 (Sheet 1), slacken screws on the two support clamps (4) nearest the air motor.

C (e) Remove bolts (5) from rear connector (6) and
C remove connector.

C (f) With aw core.

R (g) Remove grease from shaft core (Ref. 12-21-31,
R Servicing).

(4) Remove flexible drive core, air motor R.H. output drive pad to L.H. upper gearbox - engines incorporating S.B.78-3302.

(a) Position working platform in cold stream duct.

(b) Enter cold stream duct and remove air motor R.H. access panel 418DR or 428DR for engines No.1 or 3 (Ref. 72-03-00) or 438DR for engine No.2 (Ref. 72-03-00).

(c) On engines incorporating S.B.78-3551, refer to fig.402, remove nuts and bolts (1) and remove support plate detachable leg (2).

C (d) Refer to fig.401 (Sheet 2), remove bolts (5) from rear connector (6) and remove connector.

C (e) Withdraw core.

R (f) Remove grease from core (Ref. 12-21-31, Servicing).

(5) Remove flexible drive core, air motor L.H. output drive pad to R.H. upper gearbox - engines not incorporating S.B.78-3302.

(a) Position working platform in cold stream duct.

(b) Enter cold stream duct and remove following access panels from interservices fairing (Ref. 72-03-00):

Engines No.1 and 3

Interservices Fairing L.H. Access Panel 418BL or 428BL.
Pylon Fairing Upper L.H. Access Panel 418CL or 428CL.
Air Motor L.H. Access Panel 418DL or 428DL.

Engine No.2

Interservices Fairing L.H. Access Panel 438BL.
Pylon Fairing Upper L.H. Access Panel 438CL.
Air Motor L.H. Access Panel 438DL.

C (c) Deleted

C (d) Refer to fig.401 (Sheet 1), slacken screws on the two support clamps (9) nearest the air motor.

C (e) Remove bolts (10) from rear connector (11) and remove connector.

C (f) Withdraw core.

R (g) Remove grease from core (Ref. 12-21-31, Servicing).

(6) Remove flexible drive core, air motor L.H. output drive pad to R.H. upper gearbox - engines incorporating S.B.78-3302.

(a) Position working platform in cold stream duct.

(b) Enter cold stream duct and remove air motor L.H. access panel 418DL or 428DL for engines No.1 or 3 (Ref. 72-03-00) or 438DL for engine No.2 (Ref. 72-03-00).

(c) On engines incorporating S.B.78-3551, refer to fig.402, remove nuts and bolts (1) and remove support plate detachable leg (2)

C (d) Refer to fig.401 (Sheet 2), remove bolts (10) from rear connector (11) and remove connector.

C (e) Withdraw core.

R (f) Remove grease from core (Ref. 12-21-31, Servicing).

B. Install Flexible Drive Cores

(1) Equipment required:

CP.20309 or XUT.37594	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece

(2) Ensure thrust reverser is locked and associated systems are deactivated as detailed in operation 2.A. (2).

(3) Install flexible drive core, air motor R.H. output drive pad to L.H. upper gearbox - engines not incorporating S.B.78-3302.

(a) Ensure working platform is in position in cold stream duct.

R R (b) Apply grease to core in accordance with 12-21-31, Servicing.

R (c) Position core in outer casing ensuring correct engagement of square drive at L.H. upper gearbox.

CR (d) Refer to fig.401 (Sheet 1), position connector (6) on air motor R.H. output drive pad, fit and secure bolts (5); torque tighten to 25-30 lb.in.

R (e) Tighten screws on the two support clamps (4) nearest the air motor.

CR (f) Deleted

CR (g) Fit following access panels to interservices fairing (Ref. 72-30-00):

Engines No.1 and 3

Interservices Fairing R.H. Access Panel 418BR or 428BR.
Pylon Fairing Upper R.H. Access Panel 418CR or 428CR.
Air Motor R.H. Access Panel 418DR or 428DR.

Engine No.2

Interservices Fairing R.H. Access Panel 438BR.
Pylon Fairing Upper R.H. Access Panel 438CR.
Air Motor R.H. Access Panel 438DR.

CR (h) Remove working platform from cold stream duct.

(4) Install flexible drive core, air motor R.H. output drive pad to L.H. upper gearbox - engines incorporating S.B.78-3302.

(a) Ensure working platform is in position in cold stream duct.

R (b) Apply grease to core in accordance with 12-21-31,
R Servicing.

R (C) Position core in outer casing ensuring correct engagement of square drive at L.H. upper gearbox.

CR (d) Refer to fig.401 (Sheet 2), position connector (6) on air motor R.H. output drive pad and secure bolts (5); torque tighten to 25-30 lb.in.

CR (e) Deleted.

CR (f) Fit air motor R.H. access panel 418DR or 428DR for engines No.1 or 3 (Ref. 72-03-00) or 438DR for engine No.2 (Ref. 72-03-00).

CR (g) Remove working platform.

(5) Install flexible drive core, air motor L.H. output drive pad to R.H. upper gearbox - engines not incorporating S.B.78-3302.

(a) Ensure working platform is in position in cold stream duct.

R R (b) Apply grease to core in accordance with 12-21-31, Servicing.

R (c) Position core in outer casing ensuring correct engagement of square drive at R.H. upper gearbox

CR C C (d) Refer to fig.401 (Sheet 1), position connector (11) on air motor L.H. ouput drive pad, fit and secure bolts (10; torque tighten to 25-30 lb.in.

CR (e) Tighten screws on the two support clamps (9) nearest the air motor.

CR (f) Deleted

CR (g) Fit following access panels to interservices fairing (Ref. 72-03-00):

Engines No.1 and 3

Interservices Fairing L.H. Access Panel 418BL or 428BL.
Pylon Fairing Upper L.H. Access Panel 418CL or 428CL.
Air Motor L.H. Access Panel 418DL or 428DL.

Engine No.2

Interservices Fairing L.H. Access Panel 438BL.
Pylon Fairing Upper L.H. Access Panel 438CL.
Air Motor L.H. Access Panel 438DL.

CR (h) Remove working platform.

(6) Install flexible drive core, air motor L.H. output drive pad to R.H. upper gearbox - engines incorporating S.B.78-3302.

(a) Ensure working platform is in position in cold stream duct.

R R (b) Apply grease to core in accordance with 12-21-31, Servicing.

R (c) Position core in outer casing ensuring correct engagement of square drive at R.H. upper gearbox.

CR C C (d) Refer to fig.401 (Sheet 2), position connector (11) on air motor L.H. output drive pad, fit and secure bolts (10; torque tighten to 25-30 lb.in.

CR (e) Deleted

CR (f) Fit air motor L.H. access panel 418DL or 428DL for engine No.1 and 3 (Ref. 72-03-00) or 438DL for engine No.2 (Ref. 72-03-00).

CR (g) Remove working platform.

(7) Unlock and reactivate thrust reverser and associated system (Ref. 78-30-00, Servicing).

(8) Before next flight, operationally test thrust reverser system (Ref. 71-00-00).

TRANSLATING COWL FLEXIBLE DRIVES, ENGINE MOUNTED - INSPECTION/CHECK

1. Inspect Flexible Drive Assembly

A. WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00, Servicing).

B. Remove flexible drive core from outer casing (Ref. Removal/Installation).

C. Inspect flexible drive outer casing for the following:

R (1) Check braid wire for twisting and broken strand wires.

R (2) Check casing for hot spots or discoloured areas.

R (3) Check flanges for cracks, and elongated bolt holes.

R (4) Check end fittings for security, cracks and uneven wear.

R (5) Check casing for signs of lubrication leakage through
R braid wire.

R (6) Check casing for signs of bulging, distortion, dents and
R abrasions.

R For acceptance standards see para.2.A.

D. Inspect flexible drive core for the following:

R (1) Check drive ends for rounded corners, twisting,
R indentations and burrs.

R (2) Check core for wear and broken wire.

R (3) Check core for abnormal wire spacing (strand separation).

R (4) Check core for permanent helixing, kinks and
R discontinuities.

R (5) Check core for lack of grease.

R For acceptance standards see para.2.B.

E. Install flexible drive core (Ref. Removal/Installation).

F. Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

2. Acceptance Standards

A. Flexible drive outer casing

R (1) Casing braid wire twisting in excess of 30 degrees, or more than 10 braid strand groups broken, reject.

R (2) Hot spots or discoloured areas indicating excessive internal friction or wear, reject.

R (3) Cracked flanges and elongated bolt holes, reject.

R (4) Cracked or unevenly worn end fittings, reject.

R (5) Lubrication leakage through braid wire, reject.

R (6) Bulging, distortion, dents and abrasions are not acceptable, reject.

B. Flexible drive core

R (1) Rounded corners, twisting, indentations and burring of drive ends, reject.

R (2) A broken wire, or wires which exhibit wear more than 25 per cent of their cross section, reject.

R (3) Abnormal wire spacing is not acceptable, reject.

R (4) Permanent helixing, kinks and discontinuities, reject.

R (5) Apply grease to core in accordance with 12-21-31, Servicing.

TRANSLATING COWL FLEXIBLE DRIVE, THRUST REVERSER MOUNTED - REMOVAL/INSTALLATION

R 1. Remove Translating Cowl Flexible Drive Shafts

R The procedure for removing individual flexible drive shafts is
R contained in the following paragraphs:

R Flexible drive shaft situated between L.H. upper (No.6) and
R L.H. centre (No.5) gearboxes - Paragraph A.

R Flexible drive shaft situated between R.H. upper (No.1) and
R R.H. centre (No.2) gearboxes - Paragraph B.

R Flexible drive shaft situated between R.H. centre (No.2) and
R R.H. lower (No.3) or R.H. lower and L.H. lower (No.4) or L.H.
R lower and L.H. centre (No.5) gearboxes - Paragraph C.

R NOTE: The translating cowl gearboxes are numerically identified
R viewed from the rear.

R In the event of a thrust reverser system failure that prevents
R thrust reverser operation to reverse thrust position or the
R translating cowl being manually cycled rearwards, carry out
R manual traversing procedure (Ref. 78-31-07).

R Service Bulletins referred to:

R S.B.78-3755 - Flexible Drive Retaining Clamps secured by
R Hexagon Headed Bolts.
R S.B.78-3875 - Sectional Firewall and Pressure Cylinder
R Assembly.

Referenced Procedures:

71-00-00	Power Plant - Adjustment/Test (Test 15).
71-11-01	L.H. Hinged Cowl - Removal/Installation.
71-11-02	R.H. Hinged Cowl - Removal/Installation.
71-12-01	L.H. and R.H. Lower Hinged Cowls - Removal/ Installation.
71-12-05	L.H. and R.H. Upper Hinged Cowls - Removal/ Installation.
71-12-03	L.H. and R.H. Mid Fixed Cowls - Removal/
R	Installation.
71-30-01	Engine Firewall - Removal/Installation
78-30-00	Thrust Reverser - Servicing and Adjustment/Test.
R 78-31-07	Translating Cowl - Maintenance Practices.

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

78-31-09 Translating Cowl Flexible Drives, Thrust Reverser Mounted.

R CAUTION: 1. IF MORE THAN ONE FLEXIBLE DRIVE SHAFT IS REMOVED, R THE THRUST REVERSER MUST BE SET (REF. 78-30-00, R ADJUSTMENT/TEST) FOLLOWING INSTALLATION OF R FLEXIBLE DRIVE SHAFTS.

R 2. DO NOT COIL FLEXIBLE DRIVE SHAFTS.

R A. Remove Flexible Drive Shaft Situated Between L.H. Upper R (No.6) and L.H. Centre (No.5) Gearboxes

(1) Equipment required:

R HU20163/1 Socket spanner

(2) Operate thrust reverser system to reverse thrust position (Ref. 78-30-00, Adjustment/Test).

(3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref. 78-30-00, Servicing).

R (4) No.1 and No.3 engines

R (a) Remove L.H. and R.H. hinged cowls, 413A or 423A R (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (5) No.2 engines

R (a) Remove L.H. and R.H. upper hinged cowls, 433DL R and 434DR (Ref. 71-12-05).

R (b) Remove L.H. and R.H. lower hinged cowls, 433AL R and 434AR (Ref. 71-12-01).

R (c) Remove L.H. and R.H. mid fixed cowls, 433CL R and 434CR (Ref. 71-12-03).

R (6) On engines not incorporating S.B.78-3875, remove
R firewall and pressure cylinder assembly (Ref. 71-30-01).

R (7) On engines incorporating S.B.78-3875, remove upper
R L.H. detachable firewall assembly and upper L.H.
R pressure cylinder (Ref. 71-30-01).

R (8) Refer to fig.401, using socket spanner, disconnect connectors (1).

R (9) On engines not incorporating S.B.78-3755, remove nuts
R and washers (5) and screws (6) them remove clamps (2),
R (3) and (4).

R (10) On engines incorporating S.B.78-3755, remove nuts (7)
R and bolts and washers (8) then remove clamps (2), (3)
R and (4).

R (11) Disengage each end of flexible drive shaft from
R translating cowl gearboxes then remove flexible drive
R shaft.

R (12) Remove bushes from flexible drive shaft and retain for
R fitment to new flexible drive shaft.

R (13) Fit approved blanks to all exposed apertures and
R connectors.

R B. Remove Flexible Drive Shaft Situated Between R.H. Upper
R (No.1) and R.H. Centre (No.2) Gearboxes

R (1) Equipment required:

R HU20163/1 Socket spanner

R (2) Operate thrust reverser system to reverse thrust
R position (Ref. 78-30-00, Adjustment/Test).

R (3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN
R REVERSE THRUST POSITION WHILE WORK IS IN
R PROGRESS.
R Deactivate and tag thrust reverser and associated
R systems and fit thrust reverser locks (Ref. 78-30-00,
R Servicing).

R (4) No.1 and No.3 engines

R (a) Remove L.H. and R.H. hinged cowls, 413A or 423A
R (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (5) No.2 engine

R (a) Remove L.H. and R.H. upper hinged cowls, 433DL and
R 434DR (Ref. 71-12-05).

R (b) Remove L.H. and R.H. lower hinged cowls, 433AL and
R 434AR (Ref. 71-12-01).

R (c) Remove L.H. and R.H. mid fixed cowls, 433CL and
R 434CR (Ref. 71-12-03).

R (6) On engines not incorporating S.B.78-3875, remove
R firewall and pressure cylinder assembly (Ref. 71-30-01).

R (7) On engines incorporating S.B.78-3875, remove upper
R R.H. detachable firewall assembly and upper R.H.
R pressure cylinder (Ref. 71-30-01).

R (8) Refer to fig.401, using socket spanner, disconnect
R connectors (1).

R (9) On engines not incorporating S.B.78-3755, remove nuts
R and washers (5) and screws (6) then remove clamps (2),
R (3) and (4).

R (10) On engines incorporating S.B.78-3755, remove nuts (7)
R and bolts and washers (8) then remove clamps (2), (3)
R and (4).

R (11) Disengage each end of flexible drive shaft from
R translating cowl gearboxes then remove flexible drive
R shaft.

R (12) Remove bushes from flexible drive shaft and retain for
R fitment to new flexible drive shaft.

R (13) Fit approved blanks to all exposed apertures and
R connectors.

R C. Remove Flexible Drive Shaft Situated Between R.H. Centre
R (No.2) and R.H. Lower (No.3) or R.H. Lower and L.H. Lower
R (No.4) or L.H. Lower and L.H. Centre (No.5) Gearboxes

R (1) Equipment required:

R HU20163/1 Socket spanner

R (2) Operate thrust reverser system to reverser thrust
R position (Ref. 78-30-00, Adjustment/Test).

R (3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN
R REVERSE THRUST POSITION WHILE WORK IS IN
R PROGRESS.
R Deactivate and tag thrust reverser and associated systems
R and fit thrust reverser locks (Ref. 78-30-00, Servicing).

R (4) No.1 and No.3 engines

R (a) Remove L.H. and R.H. hinged cowls, 413A or 423A
R (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (5) No.2 engine

R (a) Remove L.H. and R.H. upper hinged cowls, 433DL
R and 434DR (Ref. 71-12-05).

R (b) Remove L.H. and R.H. lower hinged cowls, 433AL
R and 434AR (Ref. 71-12-01).

R (c) Remove L.H. and R.H. mid fixed cowls, 433CL and
R 434CR (Ref. 71-12-03).

R (6) On engines not incorporating S.B.78-3875, remove
R firewall and pressure cylinder assembly (Ref. 71-30-01).

R (7) On engines incorporating S.B.78-3875, remove lower
R fixed firewall and pressure cylinder assembly
R (Ref. 71-30-01).

R (8) Refer to fig.401, using socket spanner, disconnect
R connectors (1).

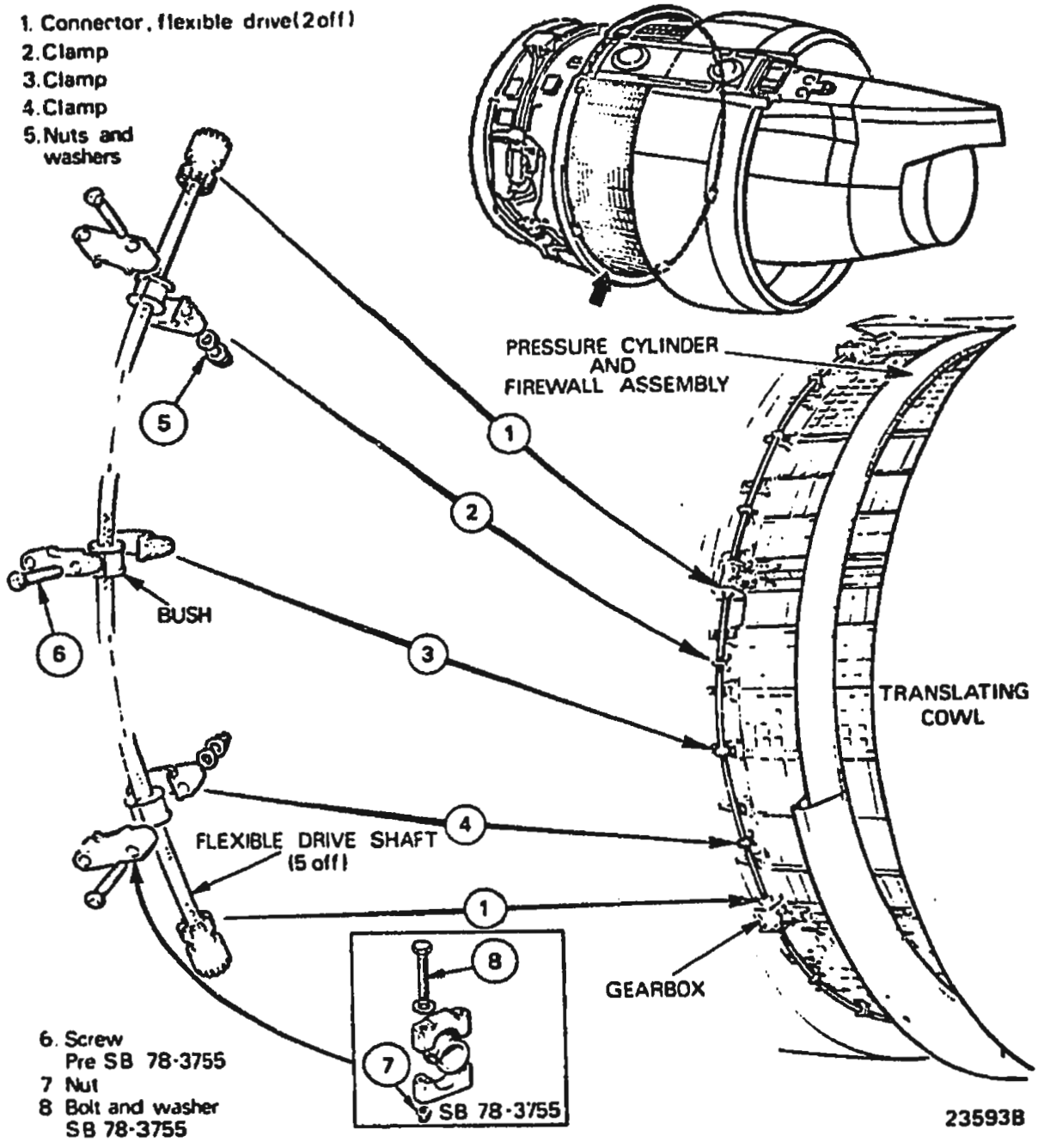
R (9) On engines not incorporating S.B.78-3755, remove nuts
R and washers (5) and screws (6) then remove clamps (2),
R (3) and (4).

R (10) On engines incorporating S.B.78-3755, remove nuts (7)
R and bolts and washers (8) then remove clamps (2), (3)
R and (4).

R (11) Disengage each end of flexible drive shaft from
R translating cowl gearboxes then remove flexible drive
R shaft.

R (12) Remove bushes from flexible drive shaft and retain for
R fitment to new flexible drive shaft.

R (13) Fit approved blanks to all exposed apertures and
R connectors.



R Thrust reverser mounted flexible drive - Removal/Installation
R Fig.401

R EFFECTIVITY: ALL

R 2. Install Translating Cowl Flexible Drive Shafts

NOTE: Flexible drive outer casings may contract during storage, therefore casings should be stretched using a 30 to 40 lb. load before installation.

R A. Install Flexible Drive Shaft Situated Between L.H. Upper
R (No.6) and L.H. Centre (No.5) Gearboxes

R (1) Equipment required:

R Clean, stiff-bristled brush
R 1702141) Tang wrench
R (AiResearch No.287532-1-1))

R (2) Material required:

		British Spec./Ref.	American Spec./Ref.	OMat Item No.
R	Degreasing fluid (Inhibited and stabilized 1.1.1 trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21
R	Jointing compound	DTD.900/ 4586 (Hylomar light)	-	426A

R (3) Ensure thrust reverser is locked and systems are
R deactivated and tagged as detailed in operation 1.A.
R (3).

R (4) Remove blanks from connectors and apertures.

R (5) WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE
R VENTILATION AND AVOID SKIN CONTACT AND
R INHALING THE VAPOUR.
R On engines not incorporating S.B.78-3875, cold liquid
R degrease mating faces of upper L.H. and R.H. detachable
R firewall assemblies, pressure cylinder and firewall
R assembly, firewall extensions (No.2 engine only) and
R inner firewall and allow to dry.

R On engines incorporating S.B.78-3875, cold liquid
R degrease mating faces of upper L.H. detachable firewall
R assembly, upper L.H. pressure cylinder, L.H. firewall
R extension (No.2 engine only) and inner firewall and
R allow to dry.

R (6) On engines not incorporating S.B.78-3875, brush apply
R a thin film of jointing compound to mating faces of
R upper L.H. and R.H. detachable firewall assemblies,
R pressure cylinder and firewall assembly, firewall
R extensions (No.2 engine only) and inner firewall.
R Allow compound to dry for a minimum period of 10
R minutes.

R (7) On engines incorporating S.B.78-3875, brush apply a
R thin film of jointing compound to mating faces of
R upper L.H. detachable firewall assembly, upper L.H.
R pressure cylinder, L.H. firewall extension (No.2
R engine only) and inner firewall. Allow compound to
R dry for a minimum period of 10 minutes.

R (8) Refer to fig.401, fit existing bushes to new flexible
R drive shaft.

R (9) Position flexible drive shaft on thrust reverser case
R and engage each end with translating cowl gearboxes.
R Connect connectors (1) and using tang wrench, torque
R tighten to 40-50 lbs.ins. (4.52-5.65 Nm).

R (10) Position clamps (2), (3) and (4) on their respective
R bushes and locate with support brackets on thrust
R reverser case.

R (11) On engines not incorporating S.B.78-3755, fit and
R secure screws (6) and nuts and washers (5) at clamp
R positions (2) and (4) and screws at clamp position (3).

R NOTE: Nuts and washers (5) are not fitted at clamp
R position (3).

R (12) On engines incorporating S.B.78-3755, fit and secure
R bolts and washers (8) and nuts (7) at clamp positions
R (2) and (4) and bolts and washers at clamp position (3).

R NOTE: Nuts (7) are not fitted at clamp position (3).

R (13) On engines not incorporating S.B.78-3875, install
R firewall and pressure cylinder assembly (Ref. 71-30-01).

R (14) On engines incorporating S.B.78-3875, install upper
R L.H. pressure cylinder and upper L.H. detachable
R firewall assembly (Ref. 71-30-01).

R (15) No.1 and No.3 engines.

R (a) Fit L.H. and R.H. hinged cowls, 413A or 423A
R (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (16) No.2 engines.

R (a) Fit L.H. and R.H. upper hinged cowls, 433DL and
R 434DR (Ref. 71-12-05).

R (b) Fit L.H. and R.H. lower hinged cowls, 433AL and
R 434AR (Ref. 71-12-01).

R (c) Fit L.H. and R.H. mid fixed cowls, 433CL and
R 434CR (Ref. 71-12-03).

R (17) Unlock and reactivate thrust reverser and associated
R systems (Ref. 78-30-00, Servicing).

R (18) Operate thrust reverser to forward thrust position
R (Ref. 78-30-00, Adjustment/Test).

R (19) Before next flight, operationally test thrust reverser
R system (Ref. 71-00-00).

R B. Install Flexible Drive Shaft Situated Between R.H. Upper
R (No.1) and R.H. Centre (No.2) Gearboxes

R (1) Equipment required:

R Clean, stiff-bristled brush
R 1702141) Tang wrench
R (AiResearch No.287532-1-1))

R (2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Degreasing fluid (Inhibited and stabilized 1.1.1 trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21
Jointing compound	DTD.900/ 4586 (Hylomar light)	-	426A

R (3) Ensure thrust reverser is locked and systems are
R deactivated and tagged as detailed in operation 1.B.
R (3).

R (4) Remove blanks from connectors and apertures.

R (5) WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE
R VENTILATION AND AVOID SKIN CONTACT AND
R INHALING THE VAPOUR.
R On engines not incorporating S.B.78-3875, cold liquid
R degrease mating faces of upper L.H and R.H. detachable
R firewall assemblies, pressure cylinder and firewall
R assembly, firewall extensions (No.2 engine only) and
R inner firewall and allow to dry.

R On engines incorporating S.B.78-3875, cold liquid
R degrease mating faces of upper R.H. detachable firewall
R assembly, upper R.H. pressure cylinder, R.H. firewall
R extension (No.2 engine only) and inner firewall and
R allow to dry.

R (6) On engines not incorporating S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only) and inner firewall. Allow compound to dry for a minimum period of 10 minutes.

R (7) On engines incorporating S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper R.H. detachable firewall assembly, upper R.H. pressure cylinder, R.H. firewall extension (No.2 engine only) and inner firewall. Allow compound to dry for a minimum period of 10 minutes.

R (8) Refer to fig.401, fit existing bushes to new flexible drive shaft.

R (9) Position flexible drive shaft on thrust reverser case and engage each end with translating cowl gearboxes. Connect connectors (1) and using tang wrench, torque tighten to 40-50 lbs.ins. (4.52-5.65 Nm.).

R (10) Position clamps (2), (3) and (4) on their respective bushes and locate with support brackets on thrust reverser case.

R (11) On engines not incorporating S.B.78-3755, fit and secure screws (6) and nuts and washers (5) at clamp positions (2) and (4) and screws at clamp position (3).

R NOTE: Nuts and washers (5) are not fitted at clamp position (3).

R (12) On engines incorporating S.B.78-3755, fit and secure bolts and washers (8) and nuts (7) at clamp positions (2) and (4) and bolts and washers at clamp position (3).

R NOTE: Nuts (7) are not fitted at clamp position (3).

R (13) On engines not incorporating S.B.78-3875, install firewall and pressure cylinder assembly (Ref. 71-30-01).

R (14) On engines incorporating S.B.78-3875, install upper R.H. pressure cylinder and upper R.H. detachable firewall assembly (Ref. 71-30-01).

R (15) No.1 and No.3 engines

R (a) Fit L.H. and R.H. hinged cowls, 413A or 423A
R (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (16) No.2 engine

R (a) Fit L.H. and R.H. upper hinged cowls, 433DL and
R 434DR (Ref. 71-12-05).

R (b) Fit L.H. and R.H. lower hinged cowls, 433AL and
R 434AR (Ref. 71-12-01).

R (c) Fit L.H. and R.H. mid fixed cowls, 433CL and 434CR
R (Ref. 71-12-03).

R (17) Unlock and reactivate thrust reverser and associated
R systems (Ref. 78-30-00, Servicing).

R (18) Operate thrust reverser to forward thrust position
R (Ref. 78-30-00, Adjustment/Test).

R (19) Before next flight, operationally test thrust reverser
R system (Ref. 71-00-00).

R C. Install Flexible Drive Shaft Situated Between R.H. Centre
R (No.2) and R.H. Lower (No.3) or R.H. Lower and L.H. Lower
R (No.4) or L.H. Lower and L.H. Centre (No.5) Gearboxes

R (1) Equipment required:

R Clean, stiff-bristled brush
R 1702141) Tang wrench
R (AiResearch No.287532-1-1))

R (2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Degreasing fluid (Inhibited and stabilized 1.1.1 trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21
Jointing compound	DTD.900/ 4586 (Hylomar light)	-	426A

R (3) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation 1.C. (3).

R (4) Remove blanks from connectors and apertures.

R (5) WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE VENTILATION AND AVOID SKIN CONTACT AND INHALING THE VAPOUR.

On engines not incorporating S.B.78-3875, cold liquid degrease mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only) and inner firewall and allow to dry.

On engines incorporating S.B.78-3875, cold liquid degrease mating faces of upper L.H. and R.H. detachable firewall assemblies, lower fixed firewall and pressure cylinder assembly, firewall extensions (No.2 engine only) and inner firewall and allow to dry.

R (6) On engines not incorporating S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only) and inner firewall. Allow compound to dry for a minimum period of 10 minutes.

R (7) On engines incorporating S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. and R.H. detachable firewall assemblies, lower fixed firewall and pressure cylinder assembly, firewall extensions (no.2 engine only) and inner firewall. Allow compound to dry for a minimum period of 10 minutes.

R (8) Refer to fig.401, fit existing bushes to new flexible drive shaft.

R (9) Position flexible drive shaft on thrust reverser case and engage each end with translating cowl gearboxes. Connect connectors (1) and using tang wrench, torque tighten to 40-50 lbs.ins. (4.52-5.65 Nm.).

R (10) Position clamps (2), (3) and (4) on their respective bushes and locate with support brackets on thrust reverser case.

R (11) On engines not incorporating S.B.78-3755, fit and secure screws (6) and nuts and washers (5) at clamp positions (2) and (4) and screws at clamp position (3).

R NOTE: Nuts and washers (5) are not fitted at clamp position (3).

R (12) On engines incorporating S.B.78-3755, fit and secure bolts and washers (8) and nuts (7) at clamp positions (2) and (4) and bolts and washers at clamp position (3).

R NOTE: Nuts (7) are not fitted at clamp position (3).

R (13) On engines not incorporating S.B.78-3875, install firewall and pressure cylinder assembly (Ref. 71-30-01).

R (14) On engines incorporating S.B.78-3875, install lower fixed firewall and pressure cylinder assembly (Ref. 71-30-01).

R (15) No.1 and No.3 engines

R (a) Fit L.H. and R.H. hinged cowls, 413A or 423A (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (16) No.2 engines

R (a) Fit L.H. and R.H. upper hinged cowls, 433DL and
R 434DR (Ref. 71-12-05).

R (b) Fit L.H. and R.H. lower hinged cowls, 433AL and
R 434AR (Ref. 71-12-01).

R (c) Fit L.H. and R.H. mid fixed cowls, 433CL and
R 434CR (Ref. 71-12-03).

R (17) Unlock and reactivate thrust reverser and associated
R systems (Ref. 78-30-00, Servicing).

R (18) Operate thrust reverser to forward thrust position
R (Ref. 78-30-00, Adjustment/Test).

R (19) Before next flight, operationally test thrust reverser
R system (Ref. 71-00-00).

R 3. Remove Translating Cowl Flexible Drive Shaft Core

R A. Remove Flexible Drive Shaft Core Situated Between L.H. Upper
R (No.6) and L.H. Centre (No.5) Gearboxes

R (1) Equipment required:

R HU20163/1 Socket spanner

R (2) Effect operations 1.A.(2) through (7).

R (3) Refer to fig.401, using socket spanner, disconnect
R connector (1) at one end of flexible drive shaft.

R (4) On engines not incorporating S.B.78-3755, slacken
R screws (6) of clamp adjacent disconnected connector
R (1).

R (5) On engines incorporating S.B.78-3755, slacken bolts
R (8) of clamp adjacent disconnected connector (1).

R (6) At the disconnected end, disengage flexible drive
R shaft from translating cowl gearbox and withdraw the
R core.

R (7) Fit approved blanks to all exposed apertures and
R connectors.

R B. Remove Flexible Drive Shaft Core Situated Between R.H.
R Upper (No.1) and R.H. centre (No.2) Gearboxes

R (1) Equipment required:

R HU20163/1 Socket spanner

R (2) Effect operations 1.B.(2) through (7).

R (3) Refer to fig.401, using socket spanner, disconnect
R connector (1) at one end of flexible drive shaft.

R (4) On engines not incorporating S.B.78-3755, slacken
R screws (6) of clamp adjacent disconnected connector
R (1).

R (5) On engines incorporating S.B.78-3755, slacken bolts (8)
R of clamp adjacent disconnected connector (1).

R (6) At the disconnected end, disengage flexible drive
R shaft from translating cowl gearbox and withdraw
R core.

R (7) Fit approved blanks to all exposed apertures and
R connectors.

R C. Remove Flexible Drive Shaft Core Situated Between R.H.
R Centre (No.2) and R.H. Lower (no.3) or R.H. Lower and
R L.H. Lower (No.4) or L.H. Lower and L.H. Centre (No.5)
R Gearboxes

R (1) Equipment required:

R HU20163/1 Socket spanner

R (2) Effect operations 1.C.(2) through (7).

R (3) Refer to fig.401, using socket spanner, disconnect
R connector (1) at one end of flexible drive shaft.

R (4) On engines not incorporating S.B.78-3755, slacken
R screws (6) of clamp adjacent disconnected connector
R (1).

R (5) On engines incorporating S.B.78-3755, slacken bolts
R (8) of clamp adjacent disconnected connector (1).

R (6) At the disconnected end, disengage flexible drive
R shaft from translating cowl gearbox and withdraw
R core.

R (7) Fit approved blanks to all exposed apertures and
R connectors.

R 4. Install Translating Cowl Flexible Drive Shaft Core

R A. Install Flexible Drive Shaft Core Situated Between L.H. Upper (No.6) and L.H. Centre (No.5) Gearboxes

R (1) Equipment required:

R Clean, stiff-bristled brush
R 1702141) Tang wrench
R (AiResearch No.287532-1-1))

R (2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Degreasing fluid (Inhibited and stabilized 1.1.1 trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21
Jointing compound	DTD.900/ 4586 (Hylomar light)	-	426A

R (3) Effect operations 2.A.(3) through (7).

R (4) Insert new core into existing flexible drive shaft case free end, push core fully home and engage with translating cowl gearbox at case anchored end.

R (5) Engage flexible drive shaft free end with translating cowl gearbox. Connect connector (1) and using tang wrench, torque tighten to 40-50 lb. ins. (4.52-5.65 Nm.).

R (6) On engines not incorporating S.B.78-3755, fully tighten screws (6) slackened in operation 3.A.(4).

R (7) On engines incorporating S.B.78-3755, fully tighten bolts (8) slackened in operation 3.A.(5).

R (8) Effect operations 2.A.(13) through (19).

R B. Install Flexible Drive Shaft Core Situated Between R.H. Upper (No.1) and R.H. Centre (No.2) Gearboxes

R (1) Equipment required:

R Clean, stiff-bristled brush
R 1702141) Tang wrench
R (AiResearch No.287532-1-1))

R (2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Degreasing fluid (Inhibited and stabilized 1.1.1 trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21
Jointing compound	DTD.900/ 4586 (Hylomar light)	-	426A

R (3) Effect operations 2.B.(3) through (7).

R (4) Insert new core into existing flexible drive shaft case free end, push core fully home and engage with translating cowl gearbox at case anchored end.

R (5) Engage flexible drive shaft free end with translating cowl gearbox. Connect connector (1) and using tang wrench, torque tighten to 40-50 lbs.ins. (4.52-5.65 Nm.)

R (6) On engines not incorporating S.B.78-3755, fully tighten screws (6) slackened in operation 3.B.(4).

R (7) On engines incorporating S.B.78-3755, fully tighten bolts (8) slackened in operation 3.B.(5).

R (8) Effect operations 2.B.(13) through (19).

R C. Install Flexible Drive Shaft Core Situated Between R.H. Centre (No.2) and R.H. Lower (No.3) or R.H. Lower and L.H. Lower (No.4) or L.H. Lower and L.H. Centre (No.5) Gearboxes

R (1) Equipment required:

R Clean, stiff-bristled brush
R 1702141) Tang wrench
R (AiResearch No.287532-1-1))

R (2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Degreasing fluid (inhibited 1.1.1. and stabilized trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21
Jointing compound	DTD.900/ 4586 (Hylomar light)	-	426A

R (3) Effect operations 2.C.(3) through (7).

R (4) Insert new core into existing flexible drive shaft case free end, push core fully home and engage with translating cowl gearbox at case anchored end.

R (5) Engage flexible drive shaft free end with translating cowl gearbox. Connect connector (1) and using tang wrench, torque tighten to 40-50 lb.ins. (4.52-5.65 Nm.).

R (6) On engines not incorporating S.B.78-3755, fully tighten screws (6) slackened in operation 3.C.(4).

R (7) On engines incorporating S.B.78-3755, fully tighten bolts (8) slackened in operation 3.C.(5).

R (8) Effect operations 2.C.(13) through (19).

TRANSLATING COWL FLEXIBLE DRIVES, THRUST REVERSER MOUNTED - INSPECTION/CHECK

1. Inspect Flexible Drive Assembly

   A. WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
   Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00, Servicing).

   B. Remove flexible drive core from outer casing (Ref. Removal/Installation).

   C. Inspect flexible drive outer casing for the following:

      (1) Outer wall for distortion, dents, abrasions and evidence of lubricant leakage through outer wall

      (2) End fittings for cracks, uneven wear and elongated bolt holes.

      (3) Twisting and broken braid wires.

      For acceptance standards see 2.A.

   D. Inspect flexible drive core for the following:

      (1) Permanent helixing, humps or kinks.

      (2) Wire strands for signs of fracture and strand outer surfaces for flattening and wear.

      (3) Drive ends for damage and/or deformation of corners.

      For acceptance standards see 2.B.

   E. Install flexible drive core (Ref. Removal/Installation).

   F. Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

2. Acceptance Standards

A. Flexible drive outer casing

(1) Distortion, dents, abrasions and leakage of lubricant through wall are not acceptable.

(2) Cracks, uneven wear and elongated bolt holes are not acceptable.

(3) Twisting of more than 30 degrees indicated by interruptio of the braid pattern and/or more than two broken braid wires evident in any one braid strand is not acceptable.

B. Flexible drive core

(1) Permanent helixing, humps, kinks and fracture are not acceptable.

(2) Worn or flattened strand surface exceeding 25 per cent of diameter of strand, and/or fractured strands are not acceptable.

(3) Damage and/or deformation of drive end corners is not acceptable.

INTERFACE TRANSLATING FAIRING (ENGINES NO.1 AND NO.3) - REMOVAL/INSTALLATION

As the removal/installation of the L.H. and R.H. interface translating fairings is identical, the following procedure applies to either.

1. Removal/Installation Interface Translating Fairing

Referenced Procedures:

78-30-00 Thrust Reverser - Servicing

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

78-31-10 Interface Translating Fairings (Engines No.1 and 3)

A. Remove Interface Translating Fairing

(1) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00).

(2) Refer to fig.401, remove screws (1) then remove seal assembly (2).

(3) Release quick release fasteners (3) then remove panel assembly (4).

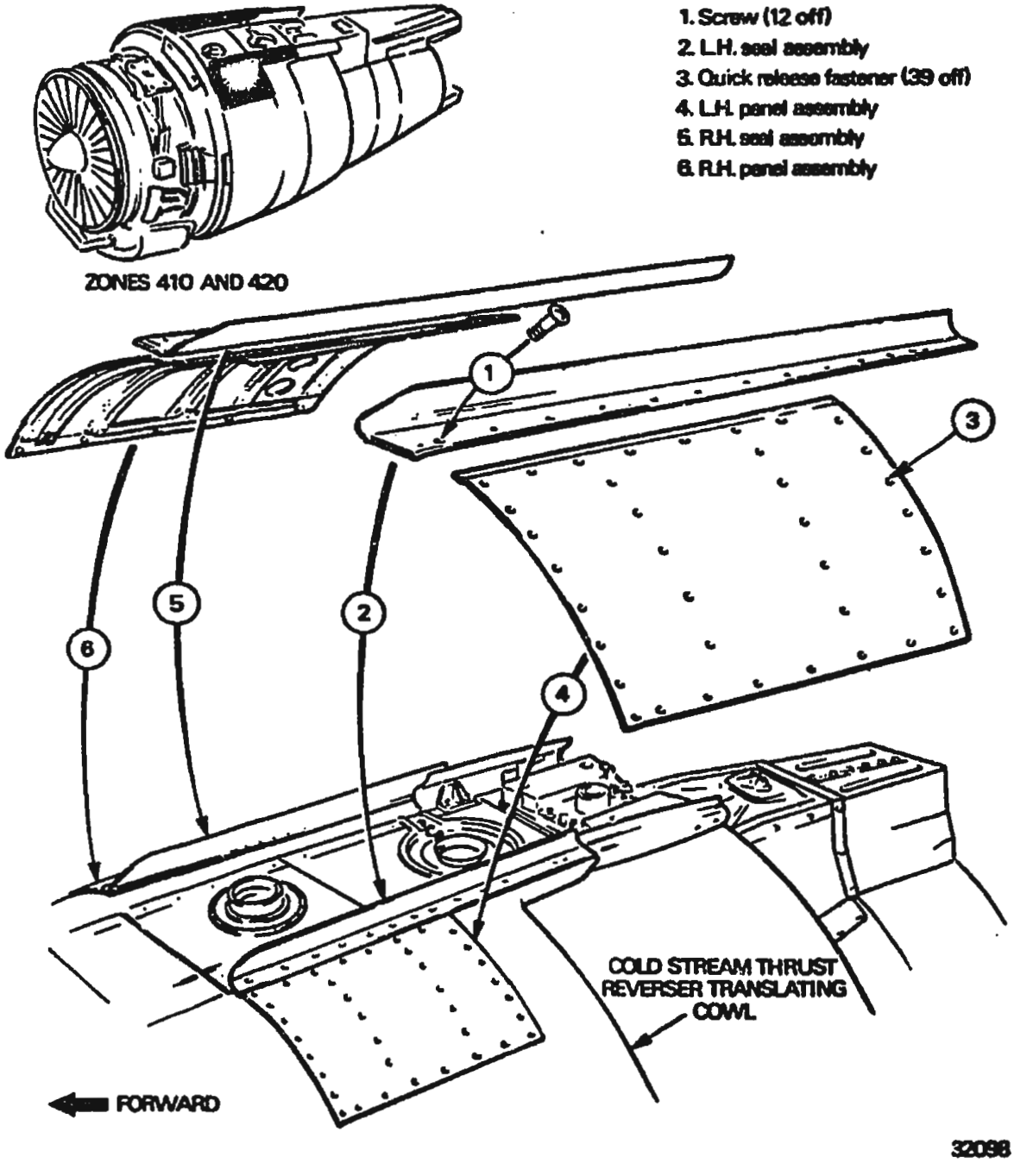
B. Install Interface Translating Fairing

(1) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation A.(1).

(2) Refer to fig.401, correctly locate panel assembly (4) on translating cowl then secure quick release fasteners (3).

(3) Correctly locate seal assembly (2) and secure with screws (1).

(4) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00).



Interface translating fairing (Engines No.1 and No.3) - removal/installation
Fig.401

INTERFACE TRANSLATING FAIRING (ENGINE NO.2) - REMOVAL/INSTALLATION

As the removal/installation of the L.H. and R.H. interface translating fairings is identical, the following procedure applies to either.

1. Removal/Installation Interface Translating Fairing (435AL or 435AR

Referenced Procedures:

78-30-00 Thrust Reverser - Servicing

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

78-31-11 Interface Translating Fairings (Engine No.2)

A. Remove Interface Translating Fairing

(1) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.

Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00).

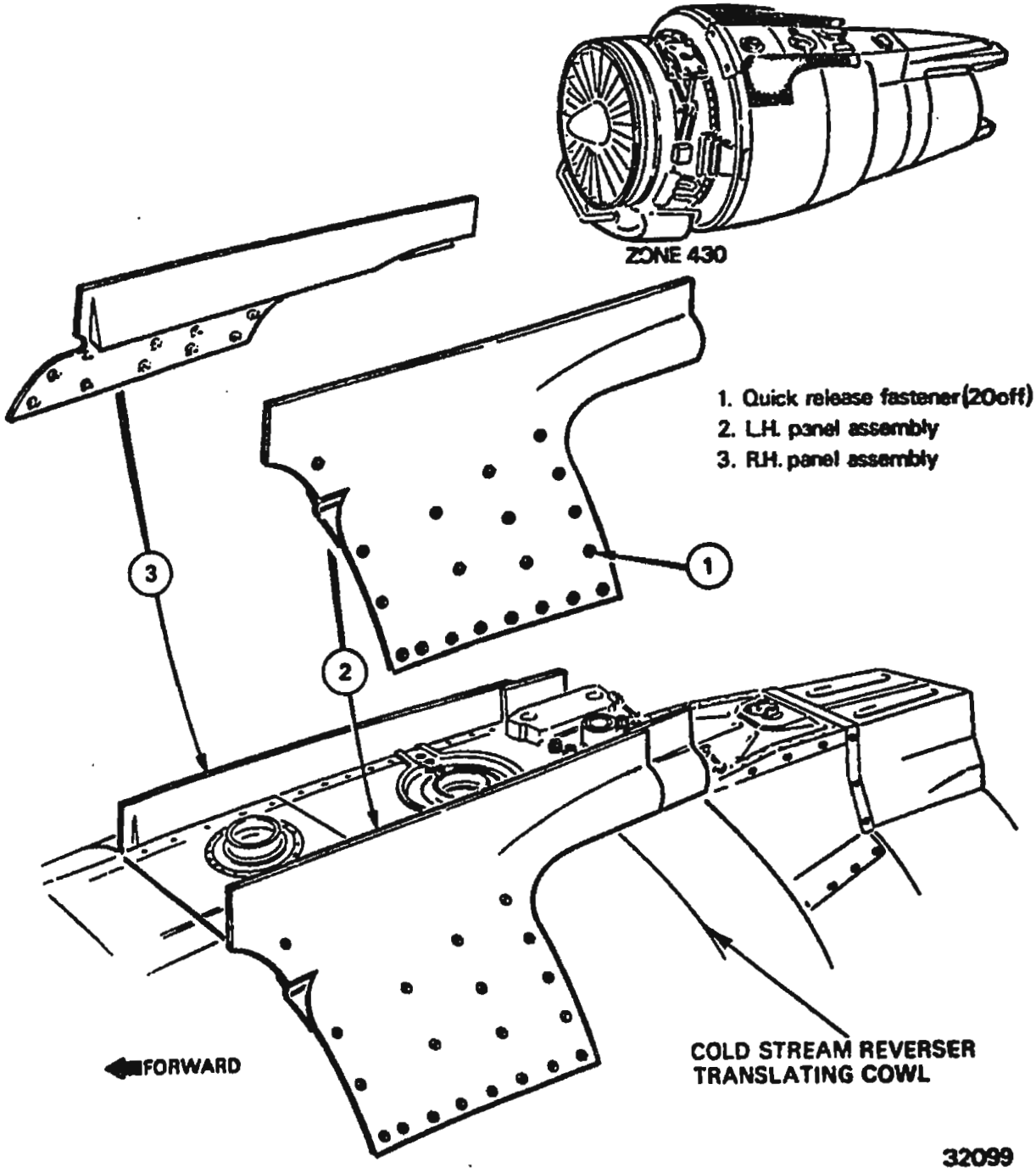
(2) Refer to fig.401, release quick release fasteners (1) and remove panel assembly (2).

B. Install Interface Translating Fairing

(1) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation A.(1).

(2) Refer to fig.401, correctly locate panel assembly (2) on translating cowl then secure quick release fasteners (1).

(3) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00).



Interface translating fairing (Engine No.2) removal/installation
Fig.401

BLOCKER FLAP - MAINTENANCE PRACTICES

1. Removal/Installation

In the event of a thrust reverser system failure that prevents thrust reverser operation to reverse thrust position or the translating cowl being manually cycled rearwards, carry out manual traversing procedure (Ref. 78-31-07).

For ease of reference, all illustrations are grouped together at the end of this section.

Service Bulletins referred to:

	S.B.78-2160	Fabricated Cascade Boxes Replaced by Cast Cascade Boxes.
	S.B.78-3273	Introduction of lightweight blocker flaps.
	S.B.78-3718	Introduction of cast steel slide brackets.
	S.B.78-4414	Blocker flap spring pins replaced by split pins.
R R	S.B.78-8169	Blocker flap front hinge assembly with improved pin retention.

Referenced Procedures:

78-30-00	Thrust Reverser - Servicing and Adjustment/Test
78-31-07	Translating Cowl - Maintenance Practices
78-31-07	Translating Cowl - Inspection/Check
78-31-20	Deflector Vane - Maintenance Practices

Illustrated Parts Catalogue References.

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

R	78-32-07	Translating Cowl, Panels and Guide Rails
R	78-32-16	Thrust Reverser, Blocker Flaps

A. Remove blocker flap

(1) Operate thrust reverser to reverse thrust position
R (Ref. 78-30-00).

(2) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks
R (Ref. 78-30-00).

(3) Remove deflector vanes (Ref. 78-31-20), as required.

(4) Refer to fig.201, remove appropriate translating cowl panel (1). Remove bolts and washers (2) and bolts (4) securing finger bracket (3).

(5) Remove appropriate acoustic tray (6).

(6) Remove hinge bolts and nuts and washers (5) from blocker flap rear hinge and remove blocker flap assembly (7).

R (7) On engines without S.B.78-3273 or with S.B.78-3718
R part 2.

R (a) Refer to fig.202 (Sheet 1) detail A, place blocker flap (4) on working surface, remove link bolt, nut and washer (1) and detach operating link (2).

R (b) Remove bolts and washers (3) and remove bracket assembly (detail B) from blocker flap (4).

R (c) Refer to fig.202 (Sheet 2), on engines with S.B.78-4414 remove and discard split cotter pin (6). On engines without S.B.78-4414, remove and discard spring pin (6).

R (d) Refer to fig.202 (Sheet 1), withdraw pin (6) then remove finger bracket (7) from slide bracket (8).

R (e) Remove sleeve bushes (9) (detail C) from slide bracket.

R (8) On engines with S.B.78-3273 or S.B.78-3718 part 1
R without S.B.78-8169.

R (a) Refer to fig.202 (Sheet 2), place blocker flap (12) on working surface, remove nut and washer (1), withdraw shoulder bolt (2) and remove operating link (3) from finger bracket (8).

R (b) Remove nuts and washers (4) and screws (5).

R (c) On engines without S.B.78-4414, remove and discard spring pin (6). On engines with S.B.78-4414, remove and discard split cotter pin (6), withdraw pin (7) then remove finger bracket (8) from slide bracket (11) and blocker flap (12).

R (d) Remove packer plate (9) and sleeve bushes (10) from slide bracket (11).

R (9) On engines with S.B.78-8169.

R (a) Refer to fig.202 (Sheet 3), place blocker flap (10) R on working surface, remove nut and washer (1) R withdraw shoulder bolt (2) and remove operating R link (3) from finger bracket (8).

R (b) Remove nuts and washers (4) and screws (5).

R (c) Slide finger bracket (6) to rear, disengage from R slide bracket (9) and blocker flap (12).

R (d) Remove sleeve bushes (8) from finger bracket (6) R pivot pin.

R (e) Remove packer plate (7) from slide bracket (9).

B. Install blocker flap

(1) Equipment required:

Inspection mirror and lamp.

(2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Jointing compound	Titanine J.C.5A DTD900 4488		479

(3) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation A.(2).

R (4) On engines without S.B.78-3273 or with S.B.78-3718
R part 2.

R (a) Refer to fig.202 (Sheet 1), insert a sleeve bush (9) (flanges opposite and facing inward) into each of the slide bracket (8) trackways and retain in position.

R (b) With slide bracket (8) flange uppermost, interpose finger bracket (7) (flange uppermost) eye end between sleeve bushes (9) flanges. Align eye end with sleeve bushes bore, insert pin (6) into a sleeve bush bore and align locking pin hole with finger bracket eye end locking pin hole then push pin (6) fully home.

R (c) On engines with S.B.78-4414 refer to fig.202 (Sheet 2), fit new split cotter pin (6) through finger bracket (7) fig.201 (Sheet 1) eye end and pin (6) locking pin hole.

On engines without S.B.78-4414, fit new spring pin (5) through finger bracket (7) eye end and pin (6) locking pin hole.

R (d) Ensure freedom of movement of pin (6) in sleeve bushes (9) bore and sleeve bushes in slide bracket (8) trackways.

R (e) Place blocker flap (4) (operating link (2) uppermost) on work surface, position slide bracket (8) together with finger bracket (7) (slide bracket leading) on blocker flap then fit and secure bolts and washers (3).

R (f) Position operating link (2) in finger bracket (7) then fit and secure link bolt and nut and washer (1).

R (5) On engines with S.B.78-3273 or S.B.78-3718 part 1 without S.B.78-3169.

R (a) Refer to fig.202 (Sheet 2), place blocker flap (12) (operating link (3) uppermost) on work surface, insert finger bracket (8) (flange trailing) through blocker flap hole, connect operating link (3) to finger bracket then fit and secure shoulder bolt (2) and nut and washer (1).

R (b) Apply a thin film of jointing compound to mating faces of packer plate (9) then slide packer plate (flat face trailing) over slide bracket (11) and position on flange. Insert a sleeve bush (10) (flanges opposite and facing inward) into each of the slide bracket trackways and retain in position.

R (c) Fit slide bracket (11) (flange trailing) to finger bracket (8) so that finger bracket eye end is interposed between sleeve bushes (10) flanges and aligned with sleeve bushes bore.

R (d) Insert pin (7) into a sleeve bush (10) bore, align locking pin hole with finger bracket (8) eye end locking pin hole then push pin (7) fully home.

R (e) On engines without S.B.78-4414, fit new spring pin (6) through finger bracket (8) eye end and pin (7) locking pin hole.

On engines with S.B.78-4414, fit new split cotter pin (6) through finger bracket (8) eye end and pin (7) locking pin hole.

R (f) Ensure freedom of movement of pin (7) in sleeve bushes (10) bore and sleeve bushes in slide bracket (11) trackways.

R (g) Position slide bracket (11) on blocker flap (12) then fit and secure screws (5) and nuts and washers (4).

R (6) On engines with S.B.78-8169.

R (a) Refer to fig.202 (Sheet 3), place blocker flap (10) (operating link (3) uppermost) on work surface, insert finger bracket (6) (flange trailing) through blocker flap hole, connect operating link (3) to finger bracket than fit shoulder bolt (2) nut and washer (1) and secure.

R (b) Apply a thin film of jointing compound to mating faces of packer plate (7) then slide packer plate (flat face trailing) over slide bracket (9) and position on flange.

R (c) Fit sleeve bushes (8) to finger bracket (6) pivot pin (flanges facing inward).

R (d) Fit slide bracket (9) to finger bracket (6) engage sleeve bushes (8) in slide bracket trackways.

R (e) Ensure freedom of movement of sleeve bushes (8) in slide bracket (9) trackways.

R (f) Position slide bracket (9) on blocker flap (10) then fit screws (5) nuts and washers (4) and secure.

R (7) Refer to fig.201, position blocker flap assembly (7) in cold stream duct then fit and secure hinge bolts and nuts and washers (5) at rear hinge position.

R (8) Fit acoustic tray (6).

R (9) Position finger bracket (3) on translating cowl ring assembly then fit and secure bolts and washers (2) and bolts (4).

R (10) Fit translating cowl panel (1).

R (11) Fit deflector vanes (Ref. 78-31-20).

R (12) On engines with S.B.78-2160 refer to fig.203, slacken bolts (4), slide buffer blocks (5) rearward then tighten bolts (4).

R (13) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00).

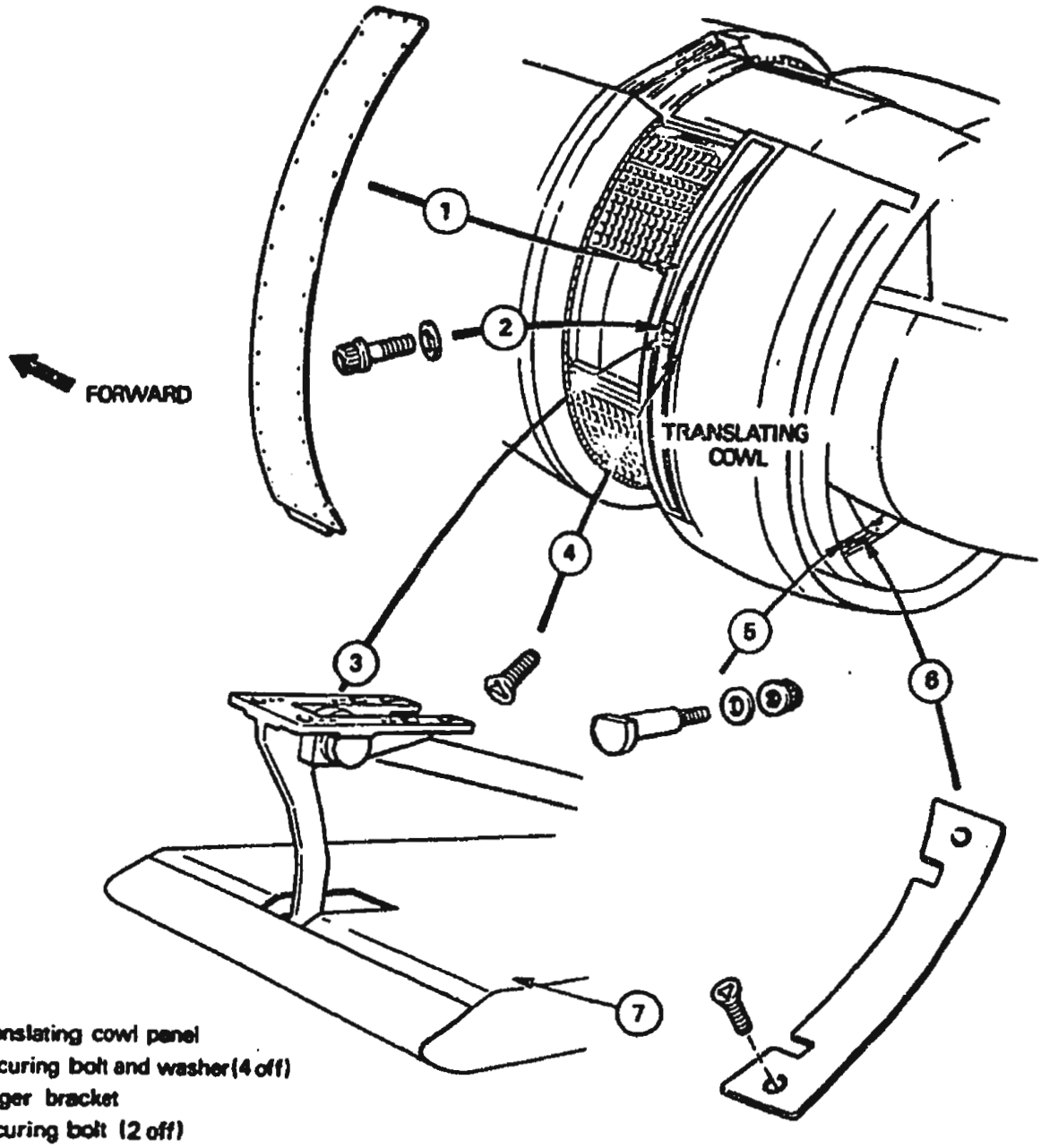
R (14) Operate thrust reverser to forward thrust position (Ref. 78-30-00).

R (15) Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks
R (Ref. 78-30-00).

R (16) Refer to fig.203, open swivel flaps and hold open. Slacken bolts (4) and viewing (if possible) with inspection mirror and lamp, adjust buffer blocks (5) until they abut buffer pads (6) on deflector vane assembly (2) then tighten bolts (4) and release swivel flaps.

R (17) Check that blocker flap droop is within limits
R (Ref.78-31-07).

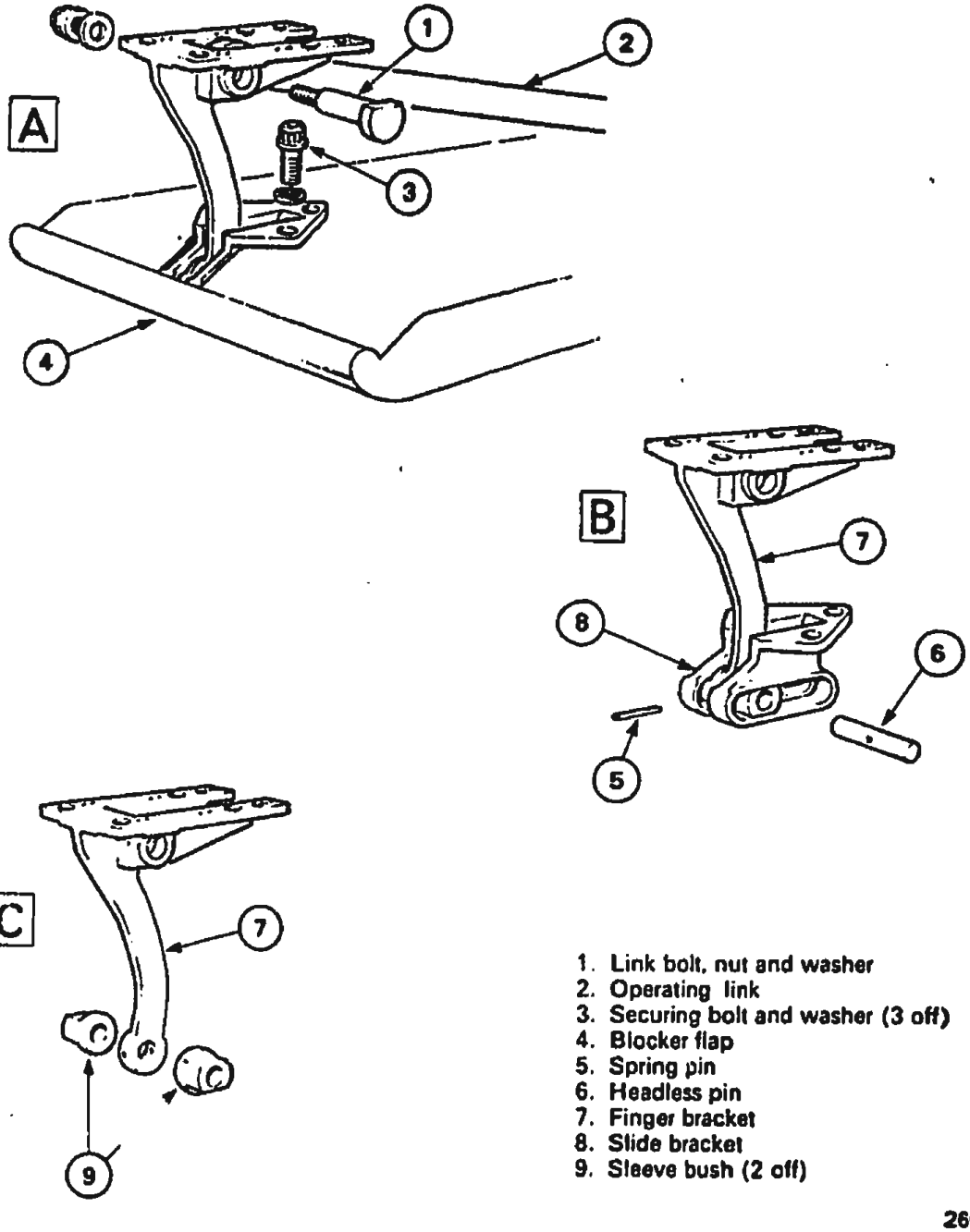
R (18) Unlock and reactivate thrust reverser and associated
R systems (Ref. 78-30-00).



1. Translating cowl panel
2. Securing bolt and washer (4 off)
3. Finger bracket
4. Securing bolt (2 off)
5. Hinge bolt and nut (2 off)
6. Acoustic tray
7. Blocker flap assembly

35842

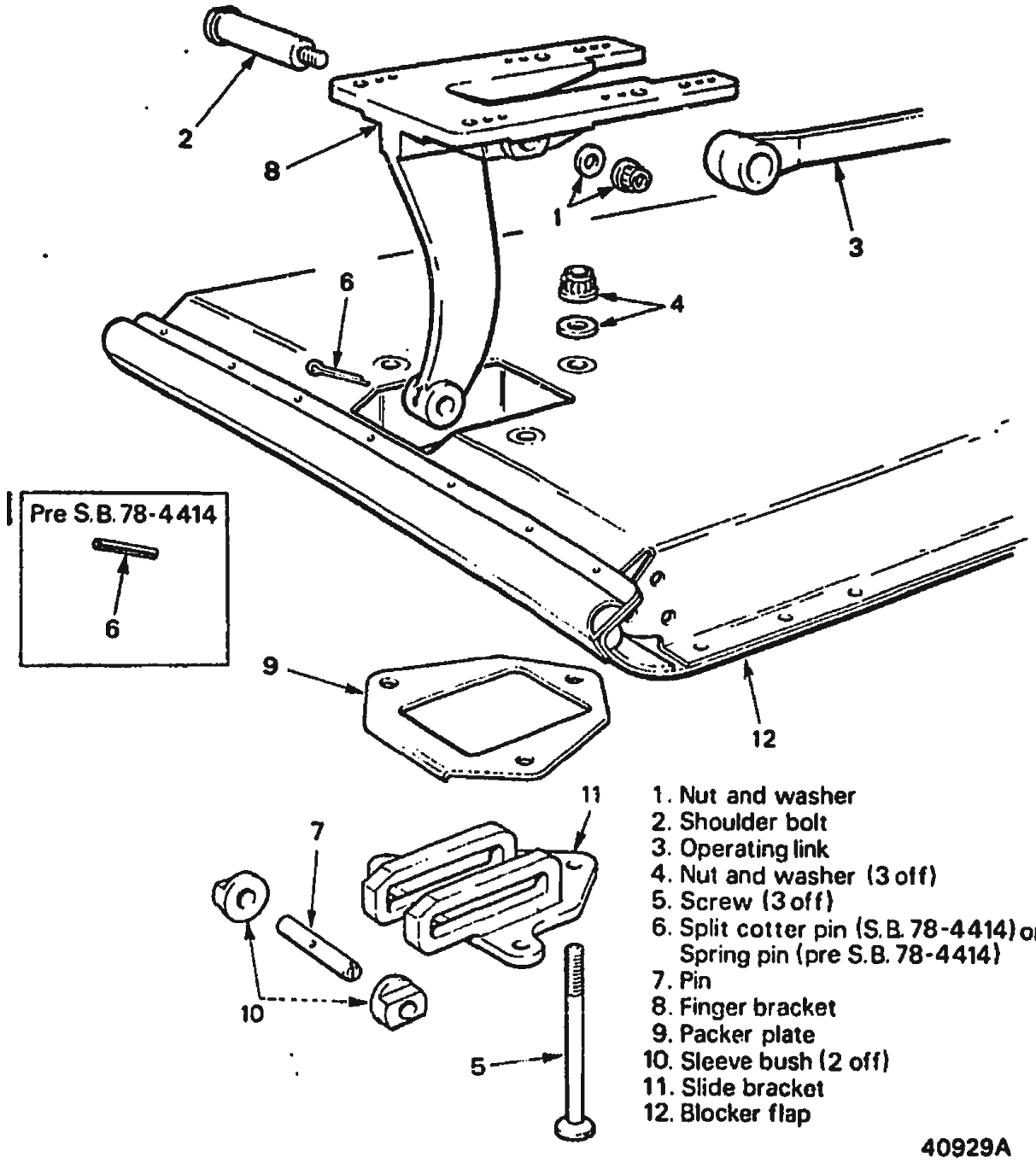
Blocker flap-Removal/Installation
Fig.201



1. Link bolt, nut and washer
2. Operating link
3. Securing bolt and washer (3 off)
4. Blocker flap
5. Spring pin
6. Headless pin
7. Finger bracket
8. Slide bracket
9. Sleeve bush (2 off)

26014A

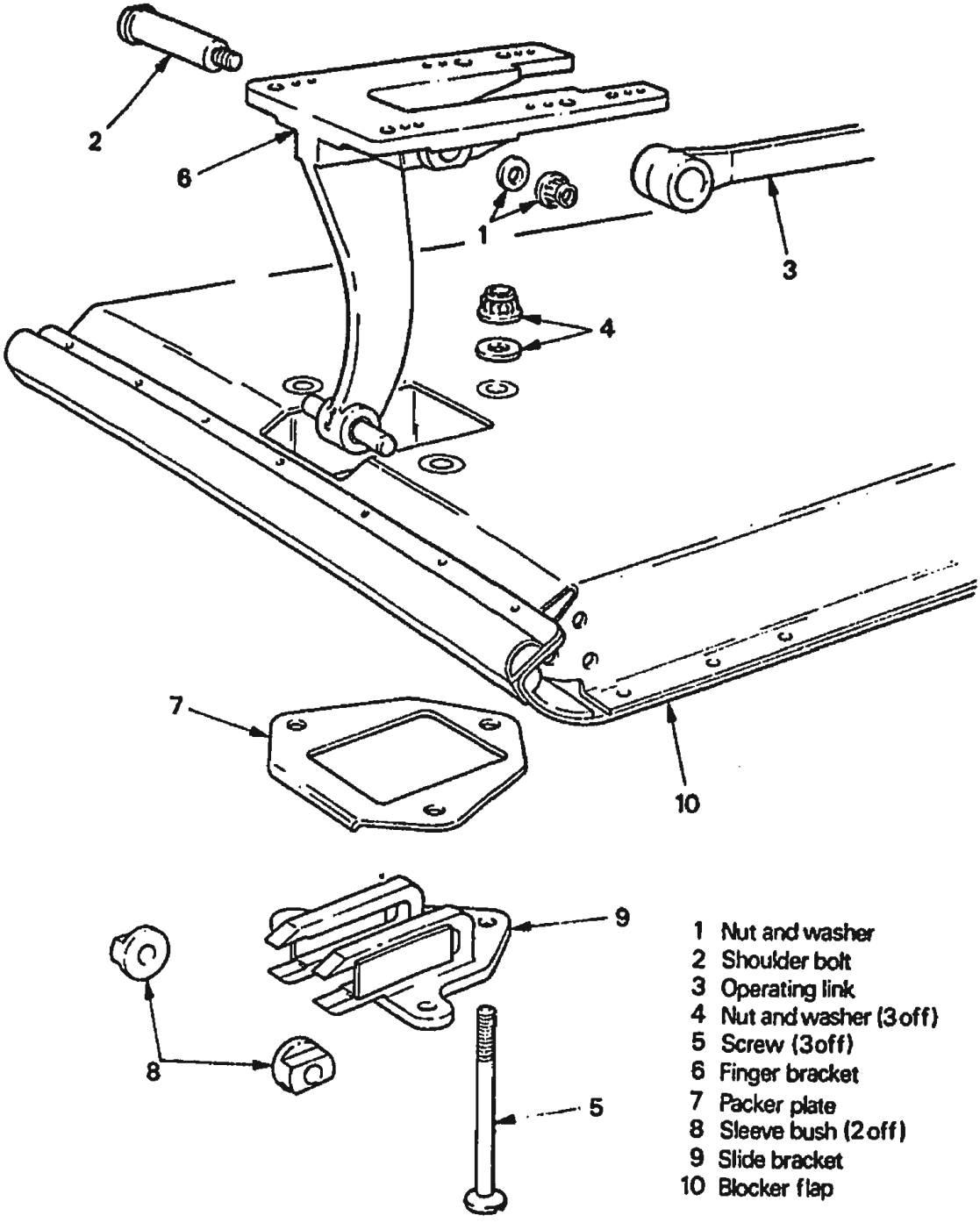
Blocker flap disconnect
Fig.202 (Sheet 1)



1. Nut and washer
2. Shoulder bolt
3. Operating link
4. Nut and washer (3 off)
5. Screw (3 off)
6. Split cotter pin (S.B. 78-4414) or Spring pin (pre S.B. 78-4414)
7. Pin
8. Finger bracket
9. Packer plate
10. Sleeve bush (2 off)
11. Slide bracket
12. Blocker flap

40929A

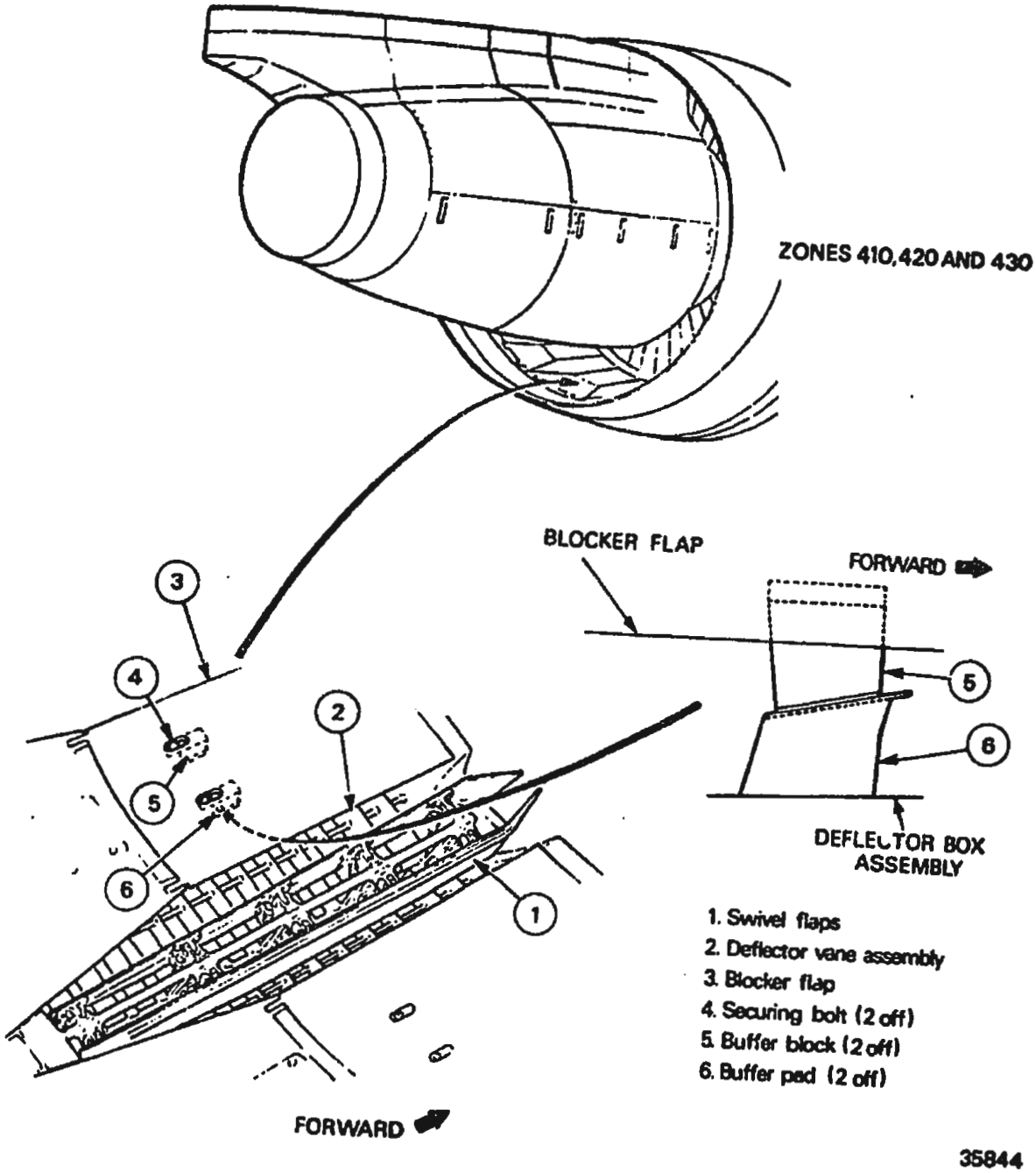
Blocker flap disconnect
Fig.202 (Sheet 2)



1 Nut and washer
2 Shoulder bolt
3 Operating link
4 Nut and washer (3off)
5 Screw (3off)
6 Finger bracket
7 Packer plate
8 Sleeve bush (2off)
9 Slide bracket
10 Blocker flap

A2609

R Blocker flap disconnect
R Fig.202 (Sheet 3)



Set buffer assembly
Fig.203

TRANSLATING COWL GEARBOX - REMOVAL/INSTALLATION

1. Remove Translating Cowl Gearboxes

The procedure for removing individual translating cowl gearboxes is contained in the following paragraphs:

L.H. upper (No.6) gearbox - Paragraph A.
R.H. upper (No.1) gearbox - Paragraph B.
R.H. centre (No.2) gearbox - Paragraph C.
L.H. centre (No.5) gearbox - Paragraph D.
Lower R.H. (No.3) or L.H. (No.4) gearbox - Paragraph E.

NOTE: The translating cowl gearboxes are numerically identified viewed from the rear.

In the event of a thrust reverser system failure that prevents thrust reverser operation to reverse thrust position or the translating cowl being manually cycled rearwards, carry out manual traversing procedure (Ref. 78-31-07).

For ease of reference, all illustrations are grouped together at the end of this section.

Service Bulletins referred to:

S.B.71-2472 - Engine Firewall - Gearbox Access Cover Attachment Bolt Replaced by Dowel.
S.B.71-2662 - Electrical Harness Looms Re-routed to Clear Thrust Reverser Feedback Linkage.
R S.B.71-4991 - Deletion of No.1 Gearbox Access Cover
S.B.76-2207 - Feedback Gearbox Link Rotated 90 Degrees.
S.B.76-2675 - Engine Controls - Feedback Linkage, Inverted Securing Bolt.
S.B.78-3275 - Translating Cowl Guide Rail Mounting and Nut Housing Shims Secured.
S.B.78-3852 - Access to Centre Gearbox Lock Latch.
S.B.78-3875 - Sectioned Firewall and Pressure Cylinder Assembly.
S.B.78-3882 - Detachable Firewall and Pressure Cylinder with Removable Sections Giving Access to Feedback Gearbox.
AiResearch S.B.121190-78-1284 Mod.V-4716 (RR S.B.78-4892) - Introduction of Spannering Flats on Screwjack.

1

Referenced Procedures:

	70-02-01	Identification, Lubrication and Fitting of Rubber Sealing Rings.
	71-00-00	Power Plant - Adjustment/Test.
	71-11-01	L.H. Hinged Cowl - Removal/Installation.
	71-11-02	R.H. Hinged Cowl - Removal/Installation.
	71-12-01	L.H. and R.H. Lower Hinged Cowls - Removal/ Installation.
	71-12-03	L.H. and R.H. Mid Fixed Cowls - Removal/ Installation.
	71-12-05	L.H. and R.H. Upper Hinged Cowl - Removal/ Installation.
	71-30-01	Engine Firewall - Removal/Installation.
R R	76-11-00	Engine Power and Thrust Reverser Linkage - Adjustment/Test.
	78-30-00	Thrust Reverser - Servicing and Adjustment/Test.
R	78-31-07	Translating Cowl - Maintenance Practices.

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

	71-30-01	Engine Firewall.
	76-11-02	Engine Power and Thrust Reverser Linkage.
R	78-31-08	Engine Mounted Translating Cowl Flexible Drives.
	78-31-09	Thrust Reverser Mounted Translating Cowl Flexible Drives.
	78-31-17	Translating Cowl Gearboxes Installation.
	78-31-19	Translating Cowl Screwjacks Installation.
R	78-31-36	Translating Cowl Locking Mechanism.
	78-31-41	Engine Mounted Translating Cowl Locking Mechanism.

R A. Remove Upper L.H. (feedback) Gearbox (No.6)

(1) Equipment required:

HU20163/1	Socket spanner
1702148 (AiResearch No.287925-1)	Screwdriver, special

1

(2) Operate thrust reverser to reverse thrust position (Ref. 78-30-00, Adjustment/Test).

(3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref. 78-30-00, Servicing).

(4) No.1 and No.3 engines

(a) Remove L.H. and R.H. hinged cowls, 413A or 423A (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

(5) No.2 engine

(a) Remove L.H. and R.H. upper hinged cowls, 433DL and 434DR (Ref. 71-12-05).

(b) Remove L.H. and R.H. lower hinged cowls, 433AL and 434AR (Ref. 71-12-01).

(c) Remove L.H. and R.H. mid fixed cowls, 433CL and 434CR (Ref. 71-12-03).

(6) On engines without S.B.78-3875 and S.B.78-3882, remove firewall and pressure cylinder assembly (Ref. 71-30-01).

(7) On engines with S.B.78-3875, remove upper L.H. detachable firewall assembly and upper L.H. pressure cylinder (Ref. 71-30-01).

(8) On engines with S.B.78-3882, remove upper L.H. detachable firewall and upper L.H. pressure cylinder access panels (Ref. 71-30-01).

(9) Refer to fig.402 (Sheet 2), release fasteners (1) and remove upper L.H. panel assembly (2).

(10) Refer to fig.401 (Sheet 1 or 2), disconnect feedback link (7) from relay link assembly (8) as detailed in 76-11-00.

2

(11) On engines without A.I.D.S., refer to fig.401 (Sheet 1)

(a) On engines without S.B.71-2662, remove bolts (1) and remove feedback gearbox cover (2) and feedback gearbox slider (3) then remove and discard seal ring (9) from slider (3) bore.

(b) Release brackets (6) and (6A) from L.H. gearbox access cover (5) then remove bolts (4) and access cover (5).

NOTE: Leave bracket (6) and (6A) attached to L.D. harness.

(c) On engines with S.B.71-2662, remove bolts (1) and release bracket (10) from feedback gearbox cover (2). Remove cover (2) and feedback gearbox slider (3) then remove and discard seal ring (9) from slider (3) bore.

NOTE: Leave bracket (10) attached to L.D. harness.

(d) Release bracket (6A) from L.H. gearbox access cover (5) then remove bolts (4) and cover (5).

NOTE: Leave bracket (6A) attached to L.D. harness

(12) On engines with A.I.D.S., refer to fig.401 (Sheet 2).

(a) On engines without S.B.71-2662, remove bolts (1) and remove feedback gearbox cover (2) and feedback gearbox slider (3) then remove seal ring (9) from slider (3) bore.

(b) Release bracket (6) and (6A) from L.H. gearbox access cover (5) then remove bolts (4) and access cover (5).

NOTE: Leave brackets (6) and (6A) attached to L.D. harness and A.I.D.S. loom.

3

R (c) On engines with S.B.71-2662, remove bolts (1) and release brackets (10) and (11) from feedback gearbox cover (2). Remove cover (2) and feedback gearbox slider (3) then remove and discard seal ring (9) from slider (3) bore.

R NOTE: Leave bracket (10) attached to L.D. harness and bracket (11) attached to A.I.D.S. loom.

(d) Release bracket (6A) from L.H. gearbox access cover (5) then remove bolts (4) and access cover (5).

NOTE: Leave bracket (6A) attached to L.D. harness and A.I.D.S. loom.

(13) Refer to fig.402 (Sheet 1) detail A, using socket spanner (gaining access through inner firewall assembly L.H. gearbox access hole), disconnect connector (1).

(14) Using socket spanner disconnect connector (3).

(15) Using special screwdriver, disengage lockwasher (5) from retaining nut (7), slide lockwasher rearward and locate in screwjack (6) recess for security then, using socket spanner, slacken retaining nut.

(16) Refer to fig.402 (Sheet 2), on engines without S.B.78-3275, remove screws (3) and bolts and washers (4) from translating cowl ring assembly and mechanical drive housing (8). Remove packing block (5) and plate (7) and retain for refitment.

2

(17) On engines with S.B.78-3275, remove screws (3) and bolts and washers (4) from translating cowl ring assembly and mechanical drive housing (8).

NOTE: On engines with S.B.78-3275, packing block (5) and plate (7) are fitted to the translating cowl ring assemblies.

(18) Refer to fig.402 (Sheet 1) detail A, remove bolts and washers (2) and (4).

(19) CAUTION: RETAIN SCREWJACK (6) IN THE HORIZONTAL POSITION. DO NOT ALLOW THE WEIGHT OF THE SCREWJACK TO BE SUSPENDED ON THE REAR BEARING.
Fully unscrew retaining nut (7) and release gearbox (8) from screwjack (6). Push screwjack rearward to limit permitted by screwjack rear bearing then remove gearbox.

(20) Fit approved blanks to all exposed apertures and connectors.

B. Remove Upper R.H. Gearbox (No.1)

(1) Equipment required:

HU20163/1	Socket spanner
1702148 (AiResearch No.287825-1)	Screwdriver, special

(2) Operate thrust reverser to reverse thrust position (Ref. 78-30-00, Adjustment/Test).

(3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref. 78-30-00, Servicing).

(4) No.1 and No.3 engines

(a) Remove L.H. and R.H. hinged cowls, 413A or 423A (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

2

(5) No.2 engine

(a) Remove L.H. and R.H. upper hinged cowls, 433DL and 434DR (Ref. 71-12-05).

(b) Remove L.H. and R.H. lower hinged cowls, 433AL and 434AR (Ref. 71-12-01).

(c) Remove L.H. and R.H. mid fixed cowls, 433CL and 434CR (Ref. 71-12-03).

(6) On engines without S.B.78-3875, remove firewall and pressure cylinder assembly (Ref. 71-30-01).

(7) On engines with S.B.78-3875, remove upper R.H. detachable firewall assembly and upper R.H. pressure cylinder (Ref. 71-30-01).

(8) Refer to fig.402 (Sheet 2), release fasteners (9) and remove upper R.H. panel assembly (10).

R R (9) Refer to fig.402 (Sheet 1) detail B, using socket spanner, disconnect connector (9).

R (10) Using socket spanner, disconnect connector (15).

R (11) Using special screwdriver, disengage lockwasher (11) from retaining nut (13), slide lockwasher rearward and locate in screwjack (12) recess for security then, using socket spanner, slacken retaining nut.

R (12) Refer to fig.402 (Sheet 2), on engines without S.B.78-3275, remove screws (3) and bolts and washers (4) from translating cowl ring assembly and mechanical drive housing (8). Remove packing block (5) and plate (7) and retain for refitment.

R (13) On engines with S.B.78-3275, remove screws (3) and bolts and washers (4) from translating cowl ring assembly and mechanical drive housing (8).

NOTE: On engines with S.B.78-3275, packing block (5) and plate (7) are fitted to the translating cowl ring assemblies.

2

R (14) Refer to fig.402 (Sheet 1) detail B, remove bolts and washers (10).

R (15) CAUTION: RETAIN SCREWJACK (12) IN THE HORIZONTAL POSITION. DO NOT ALLOW THE WEIGHT OF THE SCREWJACK TO BE SUSPENDED ON THE REAR BEARING.
Fully unscrew retaining nut (13) and release gearbox (14) from screwjack (12). Push screwjack rearward to limit permitted by screwjack rear bearing then remove gearbox.

R (16) Fit approved blanks to all exposed apertures and connectors.

C. Remove R.H. Centre Gearbox (No.2)

(1) Equipment required:

HU20163/1	Socket spanner
1702148 (AiResearch No.287925-1)	Screwdriver, special

(2) Operate thrust reverser to reverse thrust position (Ref. 78-30-00, Adjustment/Test).

(3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref.78-30-00, Servicing).

(4) No.1 and No.3 engines

(a) Remove L.H. and R.H. hinged cowls, 413A or 423A (Ref. 71-11-01) and 414A or 423A (Ref. 71-11-02).

(5) No.2 engine

(a) Remove L.H. and R.H. upper hinged cowls, 433DL and 434DR (Ref. 71-12-05).

(b) Remove L.H. and R.H. lower hinged cowls, 433AL and 434AR (Ref. 71-12-01).

(c) Remove L.H. and R.H. mid fixed cowls, 433CL and 434CR (Ref. 71-12-03). 2

(6) On engines without S.B.78-3875, remove firewall and pressure cylinder assembly (Ref. 71-30-01).

(7) On engines with S.B.78-3875, remove upper R.H. detachable firewall assembly and upper R.H. pressure cylinder (Ref. 71-30-01).

(8) Refer to fig.fig.402 (Sheet 2), release fasteners (9) and remove upper R.H. panel assembly (10).

(9) Refer to fig.403, disconnect lock yoke (1) from control rod housing (2).

(10) Using socket spanner, disconnect connectors (5).

(11) Using special screwdriver, disengage lockwasher (7) from retaining nut (8), slide lockwasher rearward and locate in screwjack (6) recess for security then, using socket spanner, slacken retaining nut.

(12) Refer to fig.402 (Sheet 2), on engines without S.B.78-3275, remove screws (3) and bolts and washers (4) from translating cowl ring assembly and mechanical drive housing (8). Remove packing block (6) and plate (7) and retain for fitment.

(13) On engines with S.B.72-3275, remove screws (3) and bolts and washers (4) from translating cowl ring assembly and mechanical drive housing (8).

NOTE: On engines with S.B.78-3275, packing block (6) and plate (7) are fitted to the translating cowl ring assemblies.

(14) Refer to fig.403, on engines without S.B.78-3852, remove bolts and washers (4).

2

(15) On engines with S.B.78-3852, remove bolts and washers (4) and bolts and washers (16).

(16) CAUTION: RETAIN SCREWJACK (6) IN HORIZONTAL POSITION. DO NOT ALLOW THE WEIGHT OF THE SCREWJACK TO BE SUSPENDED ON THE SCREWJACK REAR BEARING.
Fully unscrew retaining nut (8) and release gearbox (3) from screwjack (6). Push screwjack rearward to limit permitted by screwjack rear bearing then remove gearbox.

(17) Fit approved blanks to all exposed apertures and connectors.

(18) Place gearbox on one side to await transferring of locking mechanism to new gearbox.

D. Remove L.H. Centre Gearbox (No.5)

(1) Equipment required:

HU20163/1	Socket spanner
1702148 (AiResearch No.287925-1)	Screwdriver, special

(2) Operate thrust reverser to reverse thrust position (Ref. 78-30-00, Adjustment/Test).

(3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref. 78-30-00, Servicing).

(4) No.1 and No.3 engines

(a) Remove L.H. and R.H. hinged cowls, 413A or 423A (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

(5) No.2 engine

(a) Remove L.H. and R.H. upper hinged cowls, 433DL 434DR (Ref. 71-12-05).

(b) Remove L.H. and R.H. lower hinged cowls, 433AL and 434AR (Ref. 71-12-01).

(c) Remove L.H. and R.H. mid fixed cowls, 433CL and 434CR (Ref. 71-12-03).

(6) On engines without S.B.78-3875, remove firewall and pressure cylinder assembly (Ref. 71-30-01).

(7) On engines with S.B.78-3875, remove upper L.H. detachable firewall assembly and upper L.H. pressure cylinder (Ref. 71-30-01).

(8) Refer to fig.402 (Sheet 2), release fasteners (1) and remove upper L.H. panel assembly (2).

(9) Refer to fig.404, disconnect lock yoke (1) from control rod housing (2).

(10) Using socket spanner, disconnect connectors (5).

(11) Using special screwdriver, disengage lockwasher (7) from retaining nut (8), slide lockwasher rearward and locate in screwjack (6) recess for security then, using socket spanner, slacken retaining nut.

(12) Refer to fig.402 (Sheet 2), on engines without S.B.78-3275, remove screws (3) and bolts and washers (4) from translating cowl ring assembly and mechanical drive housing (8). Remove packing block (6) and plate (7) and retain for refitment.

(13) On engines with S.B.78-3275, remove screws (3) and bolts and washers (4) from translating cowl ring assembly and mechanical drive housing (8).

NOTE: On engines with S.B.78-3275, packing block (6) and plate (7) are fitted to the translating cowl ring assemblies.

2

(14) Refer to fig.404, on engines without S.B.78-3852, remove bolts and washers (4).

(15) On engines with S.B.78-3852, remove bolts and washers (4) and bolts and washers (16).

(16) CAUTION: RETAIN SCREWJACK (6) IN HORIZONTAL POSITION. DO NOT ALLOW THE WEIGHT OF THE SCREWJACK TO BE SUSPENDED ON THE SCREWJACK REAR BEARING.
Fully unscrew retaining nut (8) and release gearbox (3) from screwjack (6). Push screwjack rearward to limit permitted by screwjack rear bearing then remove gearbox.

(17) Fit approved blanks to all exposed apertures and connectors.

(18) Place gearbox on one side to await transferring of locking mechanism to new gearbox.

E. Remove Lower R.H. (No.3) or L.H. (No.4) Gearbox

(1) Equipment required:

HU20163/1	Socket spanner
1702148)	
(AiResearch No.287925-1))	Screwdriver, special

(2) Operate thrust reverser to reverse thrust position (Ref. 78-30-00, Adjustment/Test).

(3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref. 78-30-00, Servicing).

(4) No.1 and No.3 engines

(a) Remove L.H. and R.H. hinged cowls, 413A or 423A (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

2

(5) No.2 engine

(a) Remove L.H. and R.H. upper hinged cowls, 433DL and 434DR (Ref. 71-12-05).

(b) Remove L.H. and R.H. lower hinged cowls, 433AL and 434AR (Ref. 71-12-01).

(c) Remove L.H. and R.H. mid fixed cowls, 433CL and 434CR (Ref. 71-12-03).

(6) On engines without S.B.78-3875, remove firewall and pressure cylinder assembly (Ref. 71-30-01).

(7) On engines with S.B.78-3875, remove lower fixed firewall and pressure cylinder assembly (Ref. 71-30-01).

(8) Refer to fig.402 (Sheet 2), release fasteners (11) and remove lower panel assembly (12).

(9) Refer to fig.402 (Sheet 1) detail B, using socket spanner, disconnect connectors (9) and (15).

(10) Using special screwdriver, disengage lockwasher (11) from retaining nut (13), slide lockwasher rearward and locate in screwjack (12) recess for security then, using socket spanner, slacken retaining nut.

(11) Refer to fig.402 (Sheet 2), on engines without S.B.78-3275, remove screws (3) and bolts and washers (4) from translating cowl ring assembly and mechanical drive housing (8). Remove packing block (6) and plate (7) and retain for refitment.

(12) On engines with S.B.78-3275, remove screws (3) and bolts and washers (4) from translating cowl ring assembly and mechanical drive housing (8).

NOTE: On engines with S.B.78-3275, packing block (6) and plate (7) are fitted to the translating cowl ring assemblies.

2

(13) Refer to fig.402 (Sheet 1) detail B, remove bolts and washers (10).

(14) CAUTION: RETAIN SCREWJACK (12) IN A HORIZONTAL POSITION. DO NOT ALLOW THE WEIGHT OF THE SCREWJACK TO BE SUSPENDED ON THE SCREWJACK REAR BEARING.
Fully unscrew retaining nut (13) and release gearbox (14) from screwjack (12). Push screwjack rearward to limit permitted by screwjack rear bearing then remove gearbox.

(15) Fit approved blanks to all exposed apertures and connectors.

2. Install Translating Cowl Gearboxes

CAUTION: WHEN INSTALLING GEARBOX, ENSURE NAMEPLATE FACES OUTWARD FROM ENGINE.

A. Install Upper L.H. (feedback) Gearbox (No.6)

(1) Equipment required:

Clean, stiff-bristled brush
1702141)
(AiResearch No.287532-1-1)) Tang wrench
1702148)
(AiResearch No.287925-1)) Screwdriver, special

(2) Material required:

		British Spec./Ref.	American Spec./Ref.	OMat Item No.
	Degreasing fluid (Inhibited and stabilized 1.1.1. trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21
R	Jointing compound	PL.32	-	4/46

2

(3) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation 1.A.(3).

(4) Remove blanks from connectors and apertures.

(5) WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE VENTILATION AND AVOID SKIN CONTACT AND INHALING THE VAPOUR.

On engines without S.B.78-3875 and S.B.78-3882, cold liquid degrease mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly and allow to dry.

On engines with S.B.78-3875, cold liquid degrease mating faces of upper L.H. detachable firewall assembly, upper L.H. pressure cylinder, L.H. firewall extension (No.2 engine only), inner firewall translating cowl and upper L.H. panel assembly and allow to dry.

On engines with S.B.78-3882, cold liquid degrease mating faces of upper L.H. detachable firewall access panel, (No.2 engine only), upper L.H. pressure cylinder access panel, L.H. firewall extension (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly and allow to dry.

(6) On engines without S.B.78-3875 and S.B.78-3882, brush apply a thin film of jointing compound to mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

(7) On engines with S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. detachable firewall assembly, upper L.H. pressure cylinder, L.H. firewall extension (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

2

(8) On engines with S.B.78-3882, brush apply a thin film of jointing compound to mating faces of upper L.H. detachable firewall access panel, upper L.H. pressure cylinder access panel, L.H. firewall extension (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

(9) Refer to fig.402 (Sheet 1) detail A, check lockwasher (5) is in position on screwjack (6).

(10) Ensure that screwjack (6) is fully engaged in rear bearing.

(11) Locate gearbox in mounting bracket on thrust reverser case with feedback link uppermost and facing forward.

(12) Engage screwjack (6) master spline with gearbox (8) master spline and push gearbox fully home. Screw retaining nut (7) onto screwjack threads and tighten sufficiently to eliminate independent end float of the screwjack. Do not torque tighten retaining nut at this stage.

(13) Fit and secure bolts and washers (2) and bolts and washers (4).

(14) CAUTION: ON ENGINES WITHOUT AIRESEARCH S.B.121190-78-1284 (R.R. S.B.78-4892), DO NOT USE WATER PUMP PLIERS OR SIMILAR METAL GRIPS TO RESTRAIN SCREWJACK WHEN TORQUE TIGHTENING RETAINING NUT.

Using tang wrench, torque tighten retaining nut (7) to 80 - 100 lbs.ins. (9.04 - 11.31 Nm.).

On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), use spannering flats on screwjack to restrain screwjack whilst retaining nut (7) is torque tightened.

2

(15) CAUTION: IT IS ESSENTIAL THAT THERE IS FULL ENGAGEMENT OF THE GEARBOX AND SCREWJACK SPLINES AND THAT THERE IS NO INDEPENDENT ENDFLOAT OF THE SCREWJACK, AS THIS CAN RESULT IN SEVERE DAMAGE TO THE SPLINES.
Recheck screwjack for endfloat. If endfloat exists, unscrew and disengage retaining nut (7), ensure full engagement of the splines, then fully engage retaining nut and repeat operation (14) and (15).

(16) Slide lockwasher (5) up to retaining nut (7) and using special screwdriver, engage lockwasher tabs.

(17) Refer to fig.402 (Sheet 2), on engines without AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892) turn screwjack (13) by hand until mechanical drive housing (8) bolt holes align with translating cowl ring assembly bolt holes.

(18) On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), turn screwjack (13), using spannering flats, until mechanical drive housing (8) bolt holes align with translating cowl ring assembly bolt holes.

(19) On engines without S.B.78-3275, position packing block (5) and plate (7) then fit and secure bolts and washers (4) and screws (3).

(20) On engines with S.B.78-3275, fit and secure bolts and washers (4) and screws (3).

NOTE: On engines with S.B.78-3275, packing block (5) and plate (7) are fitted to the translating cowl ring assemblies.

(21) Fit upper L.H. panel assembly (2) and secure fasteners (1).

(22) Refer to fig.402 (Sheet 1) detail A, fit and secure connector (3) and (gaining access through inner firewall assembly L.H. gearbox access hole) fit and secure connector (1). Using tang wrench, torque tighten connectors to 40-50 lbs.ins. (4.52 - 5.65 Nm).

3

(23) On engines without S.B.78-3875, install firewall and pressure cylinder (Ref. 71-30-01).

(24) On engines with S.B.78-3875, install upper L.H. pressure cylinder and upper L.H. detachable firewall assembly (Ref. 71-30-01).

(25) On engines with S.B.78-3882, install upper L.H. pressure cylinder and upper L.H. detachable firewall access panels (Ref. 71-30-01).

(26) On engines without A.I.D.S., refer to fig.401 (Sheet 1).

(a) On engines without S.B.71-2662, slide L.H. gearbox access cover (5) over feedback link (7) and position on inner firewall assembly. On engines with S.B.71-2472, ensure correct engagement of dowel.

(b) Position brackets (6) and (6A) on L.H. gearbox access cover (5) so that L.D. harness runs under feedback link (7) then fit and secure bolts (4).

(c) Lubricate and fit (Ref. 70-02-01) seal ring (9) to its feedback gearbox slider (3) bore groove then insert slider (flange trailing) into L.H. gearbox access cover (5) bore and push fully home. Ensure seal ring is seated squarely on feedback link housing.

(d) Slide feedback gearbox cover (2) (flange leading) over feedback link (7) and position on L.H. gearbox access cover (5) then fit and secure bolts (1).

(e) On engines with S.B.71-2662, slide L.H. gearbox access cover (5) over feedback link (7) and position on inner firewall assembly. On engines with S.B.71-2472, ensure correct engagement of dowel.

(f) Lubricate and fit (Ref. 70-02-01) seal ring (9) to its feedback gearbox slider (3) bore groove then insert slider (flange leading) into L.H. gearbox access cover (5) bore and push fully home. Ensure seal ring is seated squarely on feedback link housing.

3

(g) Slide feedback gearbox cover (2) (flange leading) over feedback link (7) and position on L.H. gearbox access cover (5). Position bracket (10) on cover (2) flange and bracket (6A) on access cover (5) so that L.D. harness runs over feedback link (7) then fit and secure bolts (1) and (4).

(27) On engines with A.I.D.S., refer to fig.401 (Sheet 2)

(a) On engines without S.B.71-2662, slide L.H. gearbox access cover (5) over feedback link (7) and position on inner firewall assembly. On engines with S.B.71-2472, ensure correct engagement of dowel.

(b) Position brackets (6) and (6A) on L.H. gearbox access cover (5) so that L.D. harness and A.I.D.S. loom runs under feedback link (7) then fit and secure bolts (4).

(c) Lubricate and fit (Ref. 71-02-01) seal ring (9) to its feedback gearbox slider (3) bore groove then insert slider (flange trailing) into L.H. gearbox access cover (5) bore and push fully home. Ensure seal ring is seated squarely on feedback link housing.

(d) Slide feedback gearbox cover (2) (flange leading) over feedback link (7) and position on L.H. gearbox access cover (5) then fit and secure bolts (1).

(e) On engines with S.B.71-2662, slide L.H. gearbox access cover (5) over feedback link (7) and position on inner firewall assembly. On engines with S.B.71-2472, ensure correct engagement of dowel.

(f) Lubricate and fit (Ref. 71-02-01) seal ring (9) to its feedback gearbox slider (3) bore groove then insert slider (flange trailing) into L.H. gearbox access cover (5) bore and push fully home. Ensure seal ring is seated squarely on feedback link housing.

2

(g) Slide feedback gearbox cover (2) (flange leading) over feedback link (7) and position on L.H. gearbox access cover (5). Position bracket (10) on cover (2) flange so that L.D. harness runs over
R feedback link, position bracket (11) on cover (2) flange so that A.I.D.S. loom runs under feedback link and position bracket (6A) on access cover (5) then fit and secure bolts (1) and (4).

(28) No.1 and No.3 engine

(a) Fit L.H. and R.H. hinged cowls, 413A or 423A (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

(29) No.2 engine

(a) Fit L.H. and R.H. upper hinged cowls, 433DL and 434DR (Ref. 71-12-05).

(b) Fit L.H. and R.H. lower hinged cowls, 433AL and 434AR (Ref. 71-12-01).

(c) Fit L.H. and R.H. mid fixed cowls, 433CL and 434CR (Ref. 71-12-03).

(30) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

(31) Operate thrust reverser to forward thrust position (Ref. 78-30-00, Adjustment/Test).

(32) Refer to fig.401 (Sheet 1 or 2), on engines without S.B.76-2675, set feedback link (7) (Ref. 78-30-00, Adjustment/Test then connect to relay link (8). Insert bolt from above and fit nut and new cotter pin.

2

(33) On engines with S.B.76-2675, set feedback link (7) (Ref. 78-30-00, Adjustment/Test) then connect to relay link (8). Insert bolt from below and fit washer, nut and new cotter pin.

(34) On engines with S.B.76-2207, set feedback link (7) (Ref. 78-30-00, Adjustment/Test) then connect to relay link (8). Insert bolt from side and fit washer, nut and new cotter pin.

(35) Before next flight, operationally test thrust reverser system (Ref. 71-00-00).

B. Install Upper R.H. Gearbox (No.1)

(1) Equipment required:

Clean, stiff-bristled brush
1702141)
(AiResearch No.287532-1-1)) Tang wrench
1702148)
(AiResearch No.287925-1)) Screwdriver, special

(2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Degreasing fluid (Inhibited and stabilized 1.1.1. trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21
R Jointing compound	PL.32	-	4/46

(3) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation 1.B.(3).

(4) Remove blanks from connectors and apertures.

2

(5) WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE VENTILATION AND AVOID SKIN CONTACT AND INHALING THE VAPOUR.
On engines without S.B.78-3875, cold liquid degrease mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and upper R.H. panel assembly and allow to dry.

On engines with S.B.78-3875, cold liquid degrease mating faces of upper R.H. detachable firewall assembly, upper R.H. pressure cylinder, R.H. firewall extension (No.2 engine only), inner firewall, translating cowl and upper R.H. panel assembly and allow to dry.

(6) On engines without S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and upper R.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

(7) On engines with S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper R.H. detachable firewall assembly, upper R.H. pressure cylinder, R.H. firewall extension (No.2 engine only), inner firewall, translating cowl and upper R.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

(8) Refer to fig.402 (Sheet 1) detail B, check lockwasher (11) is in position on screwjack (12).

(9) Ensure that screwjack (12) is fully engaged in its rear bearing.

(10) Locate gearbox in mounting bracket on thrust reverser case with nameplate facing outwards from engine.

2

(11) Engage screwjack (12) master spline with gearbox (14) master spline and push gearbox fully home. Screw retaining nut (13) onto screwjack threads and tighten sufficiently to eliminate independent end float of the screwjack. Do not torque tighten retaining nut at this stage.

(12) Fit and secure bolts and washers (10).

(13) CAUTION: ON ENGINES WITHOUT AIRESEARCH S.B.121190-78-1284 (R.R. S.B.78-4892) DO NOT USE WATER PUMP PLIERS OR SIMILAR METAL GRIPS TO RESTRAIN SCREWJACK WHEN TORQUE TIGHTENING RETAINING NUT.
Using tang wrench, torque tighten retaining nut (13) to 80 - 100 lbs.ins. (9.04 - 11.31 Nm.).

On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892) use spannering flats on screwjack to restrain screwjack whilst retaining nut (13) is torque tightened.

(14) CAUTION: IT IS ESSENTIAL THAT THERE IS FULL ENGAGEMENT OF THE GEARBOX AND SCREWJACK SPLINES, AND THAT THERE IS NO INDEPENDENT ENDFLOAT OF SCREWJACK AS THIS CAN RESULT IN SEVERE DAMAGE TO THE SPLINES.
Recheck screwjack for endfloat. If endfloat exists, unscrew and disengage retaining nut (13) ensure full engagement of splines, then fully engage retaining nut (13) and repeat operations (13) and (14).

(15) Slide lockwasher (11) up to retaining nut (13) and using special screwdriver, engage lockwasher tabs.

(16) Refer to fig.402 (Sheet 2), on engines without AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), turn screwjack (13) by hand until mechanical drive housing (8) bolt holes align with translating cowl assembly bolt holes.

2

(17) On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), turn screwjack (13) using spannering flats, until mechanical drive housing (8) bolt holes align with translating cowl ring assembly bolt holes.

(18) On engines without S.B.78-3275, position packing block (5) and plate (7) then fit and secure bolts and washers (4) and screws (3).

(19) On engines with S.B.78-3275, fit and secure bolts and washers (4) and screws (3).

NOTE: On engines with S.B.78-3275, packing block (5) and plate (7) are fitted to the translating cowl ring assemblies.

(20) Fit upper R.H. panel assembly (10) and secure fasteners (9).

R (21) Refer to fig.402 (Sheet 1) detail B, fit and secure connector (15) and fit and secure connector (9). Using tang wrench, torque tighten connectors to 40 - 50 lbs.ins. (4.52 - 5.65 Nm).

(22) On engines without S.B.78-3875, install firewall and pressure cylinder assembly (Ref. 71-30-01).

(23) On engines with S.B.78-3875, install upper R.H. pressure cylinder and upper R.H. detachable firewall assembly (Ref. 71-30-01).

R (24) No.1 and No.3 engines

(a) Fit L.H. and R.H. hinged cowls, 413A or 423A (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

2

R (25) No.2 engine

(a) Fit L.H. and R.H. upper hinged cowls, 433DL and 434DR (Ref. 71-12-05).

(b) Fit L.H. and R.H. lower hinged cowls, 433AL and 434AR (Ref. 71-12-01).

(c) Fit L.H. and R.H. mid fixed cowls, 433CL and 434CR (Ref. 71-12-03).

R (26) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

R (27) Operate thrust reverser to forward thrust position (Ref. 78-30-00, Adjustment/Test).

R (28) Before next flight, operationally test thrust reverser system (Ref. 71-00-00).

C. Install R.H. Centre Gearbox (No.2)

(1) Equipment required:

Clean, stiff-bristled brush	
1702141 (AiResearch No.2875-1-1)	Tang wrench
1702148 (AiResearch No.287925-1)	Screwdriver, special

(2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Degreasing fluid (Inhibited and stabilized 1.1.1. trichloroethane)	B.S.4487/ 1969	Mil-T-81533	1/21
R Jointing compound	PL.32	-	4/46

2

(3) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation 1.C.(3).

(4) Remove blanks from connectors and apertures.

(5) WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE VENTILATION AND AVOID SKIN CONTACT AND INHALING THE VAPOUR.

On engines without S.B.78-3875, cold liquid degrease mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and upper R.H. panel assembly and allow to dry.

On engines with S.B.78-3875, cold liquid degrease mating faces of upper R.H. detachable firewall assembly, upper R.H. pressure cylinder, R.H. firewall extension (No.2 engine only), inner firewall, translating cowl and upper R.H. panel assembly and allow to dry.

(6) On engines without S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and upper R.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

(7) On engines with S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper R.H. detachable firewall assembly, upper R.H. pressure cylinder, R.H. firewall extension (No.2 engine only), inner firewall, translating cowl and upper R.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

(8) Transfer locking mechanism from unserviceable gearbox to new gearbox as follows:

(a) Refer to fig.403, position unserviceable and new gearboxes (3) on working surface with nameplate uppermost and retaining nut (8) towards operator.

2

(b) From unserviceable gearbox, remove bolts (9), locking plate (15), mounting plates (10) (L.H.) and (13) (R.H.), shims (11) and lock yoke (14). Place on one side to await fitment to new gearbox.

NOTE: Discard shims (11), new shims must be fitted to new gearbox.

(c) From new gearbox, remove bolts (12) and transfer to holes in unserviceable gearbox vacated by bolts (9).

(d) On new gearbox, position new shim (11) on L.H. drive pad, position L.H. mounting plate (10) on shim and secure with four of bolts (9).

(e) Locate lock yoke (14) L.H. spigot in L.H. mounting plate (10) bush. Position new shim (11) on R.H. drive pad, locate R.H. mounting plate (13) bush over lock yoke R.H. spigot and position on shim (11). Locate locking plate (15) over shoulder bolt securing spring loaded latch then fit and secure remaining four bolts (9).

(f) Using feeler gauges, simultaneously check at two positions that clearance A is within the limits 0.002 - 0.006in. (0,05 - 0,15 mm.). Adjust shims (11) thickness as necessary and recheck that clearance is within limits.

R NOTE: In the event that shims (11) require adjustment, the thickness of both shims must be adjusted by the same amount.

(9) Check lockwasher (7) is in position on screwjack (6).

(10) Ensure that screwjack (6) is fully engaged in rear bearing.

2

(11) Locate gearbox (3) in mounting bracket on thrust reverser case with nameplate facing outwards from engine.

(12) Engage screwjack (6) master spline with gearbox (3) master spline and push gearbox fully home. Screw retaining nut (8) onto screwjack threads and tighten sufficiently to eliminate independent end float of the screwjack. Do not torque tighten retaining nut at this stage.

(13) On engines without S.B.78-3852, fit and secure bolts and washers (4).

(14) On engines with S.B.78-3852, fit and secure two shorter bolts and washers (4) through gearbox upper mounting bracket and two longer bolts and washers (16) through gearbox lower mounting bracket.

(15) CAUTION: ON ENGINES WITHOUT AIRESEARCH S.B.121190-78-1284 (R.R. S.B.78-4892), DO NOT USE WATER PUMP PLIERS OR SIMILAR METAL GRIPS TO RESTRAIN SCREWJACK WHEN TORQUE TIGHTENING RETAINING NUT.

Using tang wrench, torque tighten retaining nut (8) to 80 - 100 lbs.ins. (9.04 - 11.31 Nm).

On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), use spannering flats on screwjack to restrain screwjack whilst retaining nut (8) is torque tightened.

(16) CAUTION: IT IS ESSENTIAL THAT THERE IS FULL ENGAGEMENT OF THE GEARBOX AND SCREWJACK SPLINES AND THAT THERE IS NO INDEPENDENT ENDFLOAT OF THE SCREWJACK AS THIS CAN RESULT IN SEVERE DAMAGE TO THE SPLINES.

Recheck screwjack for endfloat. If endfloat exists, unscrew and disengage retaining nut (8) ensure full engagement of splines then fully engage retaining nut and repeat operations (15) and (16).

(17) Slide lockwasher (7) up to retaining nut (8) and using special screwdriver, engage lockwasher tabs.

2

(18) Refer to fig.402 (Sheet 2), on engines without AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), turn the screwjack (13) by hand until the mechanical drive housing (8) bolt holes align with translating cowl ring assembly bolt holes.

(19) On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), turn screwjack (13), using spannering flats, until mechanical drive housing (8) bolt holes align with translating cowl ring assembly bolt holes.

(20) On engines without S.B.78-3275, position packing block (6) and plate (7) then fit and secure bolts and washers (4) and screws (3).

(21) On engines with S.B.78-3275, fit and secure bolts and washer (4) and screws (3).

NOTE: On engines with S.B.78-3275, packing block (6) and plate (7) are fitted to the translating cowl ring assemblies.

(22) Fit upper R.H. panel assembly (10) and secure fasteners (9).

(23) Refer to fig.403, fit and secure flexible drive connectors (5) to gearbox (3) and using tang wrench, torque tighten connectors to 40 - 50 lbs.ins. (4.52 - 5.65 Nm.).

(24) Connect lock yoke (1) to control rod housing (2).

(25) On engines without S.B.78-3875, install firewall and pressure cylinder assembly (Ref. 71-30-01).

(26) On engines with S.B.78-3875, install upper R.H. pressure cylinder and upper R.H. detachable firewall assembly (Ref. 71-30-01).

(27) No.1 and No.3 engines

(a) Fit L.H. and R.H. hinged cowls, 413A or 423A (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

2

(28) No.2 engine

(a) Fit L.H. and R.H. upper hinged cowls, 433DL and 434DR (Ref. 71-12-05).

(b) Fit L.H. and R.H. lower hinged cowls, 433AL and 434AR (Ref. 71-12-01).

(c) Fit L.H. and R.H. mid fixed cowls, 433CL and 434CR (Ref. 71-12-03).

(29) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

(30) Operate thrust reverser to forward thrust position (Ref. 78-30-00, Adjustment/Test).

(31) Before next flight, operationally test thrust reverser system (Ref. 71-00-00).

D. Install L.H. Centre Gearbox (No.5)

(1) Equipment required:

Clean, stiff-bristled brush
1702141 (AiResearch No.287532-1-1)) Tang wrench
1702148 (AiResearch No.287925-1)) Screwdriver, special

(2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Degreasing fluid (Inhibited and stabilized 1.1.1. trichloroethane)	B.S.4487/ 1969	Mil-T-81533	1/21
R Jointing compound	PL.32	-	4/46

2

(3) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation 1.D.(3).

(4) Remove blanks from connectors and apertures.

(5) WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE VENTILATION AND AVOID SKIN CONTACT AND INHALING THE VAPOUR.
On engines without S.B.78-3875, cold liquid degrease mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly and allow to dry.

On engines with S.B.78-3875, cold liquid degrease mating faces of upper L.H. detachable firewall assembly, upper L.H. pressure cylinder, L.H. firewall extension (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly and allow to dry.

(6) On engines without S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

(7) On engines with S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. detachable firewall assembly, upper L.H. pressure cylinder, L.H. firewall extension (No. 2 engine only), inner firewall, translating cowl and upper L.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

(8) Transfer locking mechanism from unserviceable gearbox to new gearbox as follows:

(a) Refer to fig.404, position unserviceable and new gearboxes (3) on working surface with nameplate uppermost and retaining nut (8) towards operator.

2

(b) From unserviceable gearbox, remove bolts (9), locking plate (15), mounting plates (10) (R.H.) and (13) (L.H.), shims (11) and lock yoke (14). Place on one side to await fitment to new gearbox.

NOTE: Discard shims (11), new shims must be fitted to new gearbox.

(c) From new gearbox, remove bolts (12) and transfer to holes in unserviceable gearbox vacated by bolts (9).

(d) On new gearbox, position new shim (11) on R.H. drive pad, position R.H. mounting plate (10) on shim and secure with four of bolts (9).

(e) Locate lock yoke (14) R.H. spigot in R.H. mounting plate (10) bush. Position new shim (11) on L.H. drive pad, locate L.H. mounting plate (13) bush over lock yoke L.H. spigot and position on shim (11). Locate locking plate (15) over shoulder bolt securing spring loaded latch then fit and secure remaining four bolts (9).

(f) Using feeler gauges, simultaneously check at two positions that clearance A is within the limits 0.002 - 0.006in. (0,05 - 0,15 mm.). Adjust shims (11) thickness as necessary and recheck that clearance is within limits.

R NOTE: In the event that shims (11) require adjustment, the thickness of both shims must be adjusted by the same amount.

(9) Check lockwasher (7) is in position on screwjack (6).

(10) Ensure that screwjack (6) is fully engaged in rear bearing.

(11) Locate gearbox (3) in mounting bracket on thrust reverser case with nameplate facing outwards from engine.

2

(12) Engage screwjack (6) master spline with gearbox (3) master spline and push gearbox fully home. Screw retaining nut (8) onto screwjack threads and tighten sufficiently to eliminate independant endfloat of the screwjack. Do not torque tighten retaining nut at this stage.

(13) On engines without S.B.78-3852, fit and secure bolts and washers (4).

(14) On engines with S.B.78-3852, fit and secure two shorter bolts and washers (4) through gearbox upper mounting bracket and two longer bolts and washers (16) through gearbox lower mounting bracket.

(15) CAUTION: ON ENGINES WITHOUT AIRESEARCH S.B.121190-78-1284 (R.R. S.B.78-4892), DO NOT USE WATER PUMP PLIERS OR SIMILAR METAL GRIPS TO RESTRAIN SCREWJACK WHEN TORQUE TIGHTENING RETAINING NUT.

Using tang wrench, torque tighten retaining nut (8) to 80 - 100 lbs.ins. (9,04 - 11,31 Nm.).

On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), use spannering flats on screwjack to restrain screwjack whilst retaining nut (8) is torque tightened.

(16) CAUTION: IT IS ESSENTIAL THAT THERE IS FULL ENGAGEMENT OF THE GEARBOX AND SCREWJACK SPLINES AND THAT THERE IS NO INDEPENDENT ENDFLOAT OF THE SCREWJACK AS THIS CAN RESULT IN SEVERE DAMAGE TO THE SPLINES.

Recheck screwjack for endfloat. If endfloat exists, unscrew and disengage retaining nut (8), ensure full engagement of splines then fully engage retaining nut and repeat operations (15) and (16).

(17) Slide lockwasher (7) up to retaining nut (8) and using special screwdriver, engage lockwasher tabs.

2

(18) Refer to fig.402 (Sheet 2), on engines without AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), turn the screwjack (13) by hand until mechanical drive housing (8) bolt holes align with translating cowl ring assembly bolt holes.

(19) On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), turn screwjack (13), using spannering flats, until mechanical drive housing (8) bolt holes align with translating cowl ring assembly bolt holes.

(20) On engines without S.B.78-3275, position packing block (6) and plate (7) then fit and secure bolts and washers (4) and screws (3).

(21) On engines with S.B.78-3275, fit and secure bolts and washers (4) and screws (3).

NOTE: On engines with S.B.78-3275, packing block (6) and plate (7) are fitted to the translating cowl ring assemblies.

(22) Fit upper L.H. panel assembly (2) and secure fasteners (1).

(23) Refer to fig.404, fit and secure flexible drive connectors (5) to gearbox (3) and using tang wrench, torque tighten connectors to 40 - 50 lbs.ins. (4.52 - 5.65 Nm.).

(24) Connect lock yoke (1) to control rod housing (2).

(25) On engines without S.B.78-3875, install firewall and pressure cylinder assembly (Ref. 71-30-01).

(26) On engines with S.B.78-3875, install upper L.H. pressure cylinder and upper L.H. detachable firewall assembly (Ref. 71-30-01).

(27) No.1 and No.3 engines

(a) Fit L.H. and R.H. hinged cowls, 413A or 423A (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

2

(28). No.2 engine

(a) Fit L.H. and R.H. upper hinged cowls, 433DL and 434DR (Ref. 71-12-05).

(b) Fit L.H. and R.H. lower hinged cowls, 433AL and 434AR (Ref. 71-12-01).

(c) Fit L.H. and R.H. mid fixed cowls, 433CL and 434CR (Ref. 71-12-03).

(29) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

(30) Operate thrust reverser to forward thrust position (Ref. 78-30-00, Adjustment/Test).

(31) Before next flight, operationally test thrust reverser system (Ref. 71-00-00).

E. Install Lower R.H. (No.3) or L.H. (No.4) Gearbox

(1) Equipment required:

Clean, stiff-bristled brush
1702141 (AiResearch No.287532-1-1)) Tang wrench
1702148 (AiResearch No.287925)) Screwdriver, special

(2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Degreasing fluid (Inhibited and stabilized 1.1.1. trichloroethane)	B.S.4487/ 1969	Mil-T-81533	1/21
R Jointing compound	PL.32	-	4/46

2

(3) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation 1.E.(3).

(4) Remove blanks from connectors and apertures.

(5) WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE VENTILATION AND AVOID SKIN CONTACT AND INHALING THE VAPOUR.
On engines without S.B.78-3875, cold liquid degrease mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and lower panel assembly and allow to dry.

On engines with S.B.78-3875, cold liquid degrease mating faces of upper L.H. and R.H. detachable firewall assemblies, lower fixed firewall and pressure cylinder assembly, firewall extensions (No. 2 engine only), inner firewall, translating cowl and lower panel assembly and allow to dry.

(6) On engines without S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and lower panel assembly. Allow compound to dry for a minimum period of 10 minutes.

(7) On engines with S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. and R.H. detachable firewall assemblies, lower fixed firewall and pressure cylinder assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and lower panel assembly. Allow compound to dry for a minimum period of 10 minutes.

(8) Refer to fig.402 (Sheet 1) detail B, check lockwasher (11) is in position on screwjack (12).

(9) Ensure that screwjack (12) is fully engaged in rear bearing.

(10) Locate gearbox in mounting bracket on thrust reverser case with nameplate facing outward from engine.

2

(11) Engage screwjack (12) master spline with gearbox (14) master spline and push gearbox fully home. Screw retaining nut (13) onto screwjack threads and tighten sufficiently to eliminate independent endfloat of the screwjack. Do not torque tighten retaining nut at this stage.

(12) Fit and secure bolts and washers (10).

(13) CAUTION: ON ENGINES WITHOUT AIRESEARCH S.B.121190-78-1284 (R.R. S.B.78-4892), DO NOT USE WATER PUMP PLIERS OR SIMILAR METAL GRIPS TO RESTRAIN SCREWJACK WHEN TORQUE TIGHTENING RETAINING NUT.

Using tang wrench, torque tighten retaining nut (13) to 80 - 100 lbs.ins. (9.04 - 11.31 Nm.).

On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), use spannering flats to restrain screwjack whilst retaining nut (13) is torque tightened.

(14) CAUTION: IT IS ESSENTIAL THAT THERE IS FULL ENGAGEMENT OF THE GEARBOX AND SCREWJACK SPLINES AND THAT THERE IS NO INDEPENDENT ENDFLOAT OF THE SCREWJACK AS THIS CAN RESULT IN SEVERE DAMAGE TO THE SPLINES.

Recheck screwjack for endfloat. If endfloat exists, unscrew and disengage retaining nut (13), ensure full engagement of splines, then fully engage retaining nut and repeat operations (13) and (14).

(15) Slide lockwasher (11) up to retaining nut (13) and using special screwdriver, engage lockwasher tabs.

2

(16) Refer to fig.402 (Sheet 2), on engines without AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), turn the screwjack (13) by hand until the mechanical drive housing (8) bolt holes align with translating cowl ring assembly bolt holes.

(17) On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), turn screwjack (13), using spannering flats, until mechanical drive housing (8) bolt holes align with translating cowl ring assembly bolt holes.

(18) On engines without S.B.78-3275, position packing block (6) and plate (7) then fit and secure bolts and washers (4) and screws (3).

(19) On engines with S.B.78-3275, fit and secure bolts and washers (4) and screws (3).

NOTE: On engines with S.B.78-3275, packing block (6) and plate (7) are fitted to the translating cowl ring assemblies.

(20) Fit lower panel assembly (12) and secure fasteners (11).

(21) Refer to fig.402 (Sheet 1) detail B, fit and secure flexible drive connectors (9) and (15) to gearbox (14) and using tang wrench, torque tighten connectors to 40 - 50 lbs.ins. (4.52 - 5.65 Nm.).

(22) On engines without S.B.78-3875, install firewall and pressure cylinder assembly (Ref. 71-30-01).

(23) On engines with S.B.78-3875, install lower fixed firewall and pressure cylinder assembly (Ref. 71-30-01).

(24) No.1 and No.3 engines

(a) Fit L.H. and R.H. hinged cowls, 413A or 423A (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

3

(25) No.2 engine

(a) Fit L.H. and R.H. upper hinged cowls, 433DL and 434DR (Ref. 71-12-05).

(b) Fit L.H. and R.H. lower hinged cowls, 433AL and 434AR (Ref. 71-12-01).

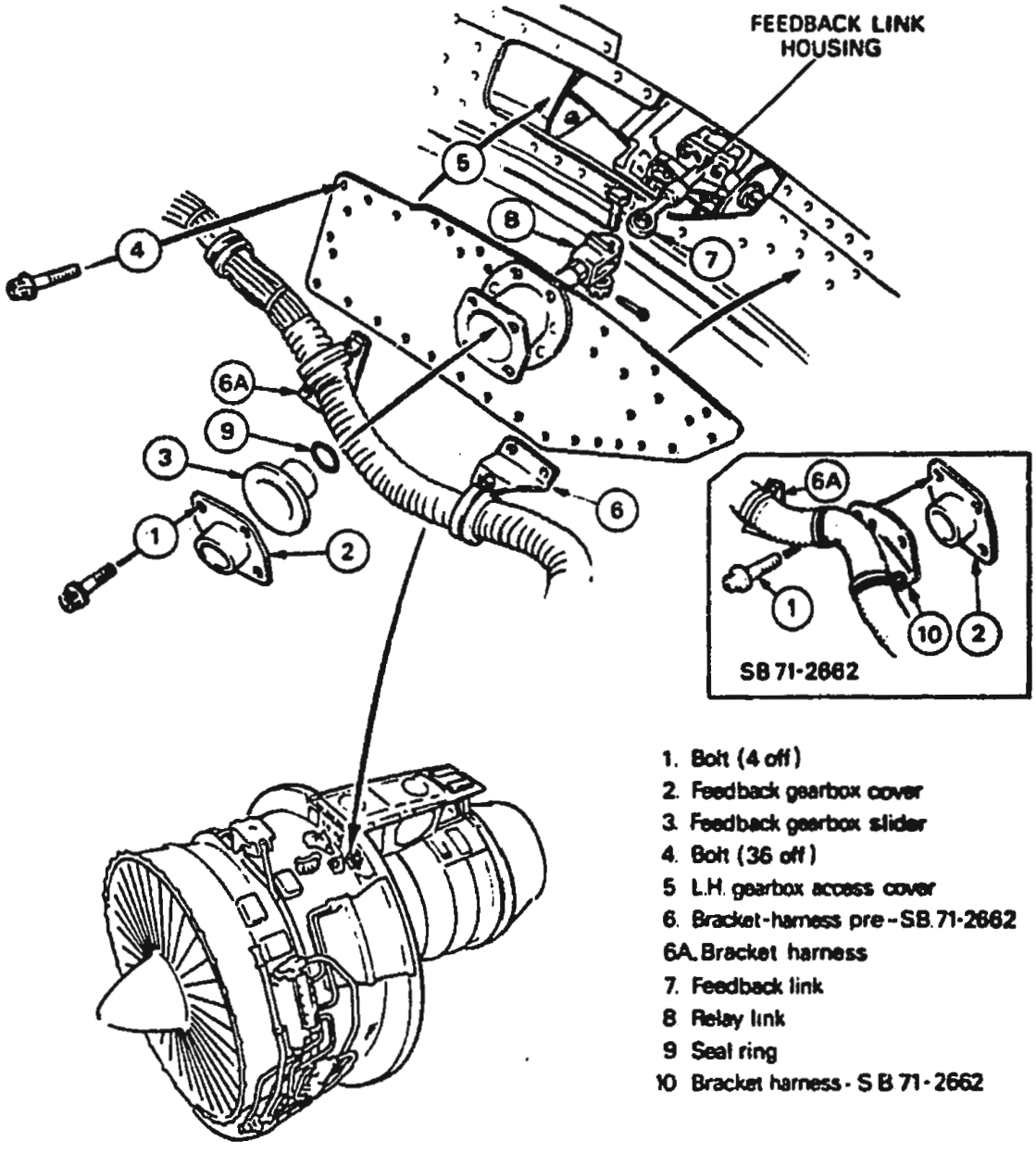
(c) Fit L.H. and R.H. mid fixed cowls, 433CL and 434CR (Ref. 71-12-03).

(26) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

(27) Operate thrust reverser to forward thrust position (Ref. 78-30-00, Adjustment/Test).

(28) Before next flight, operationally test thrust reverser system (Ref. 71-00-00).

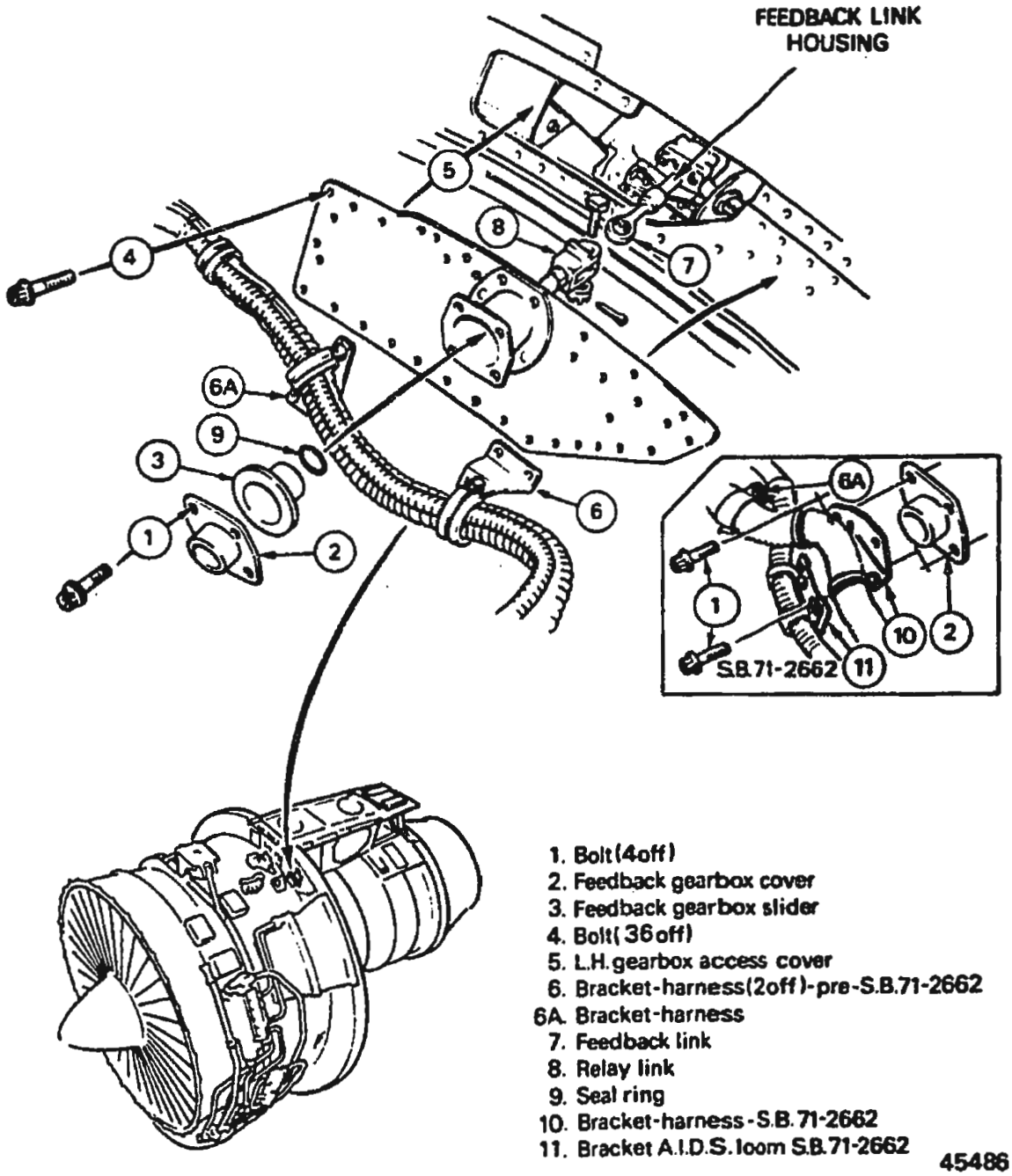
2



1. Bolt (4 off)
2. Feedback gearbox cover
3. Feedback gearbox slider
4. Bolt (36 off)
5. L.H. gearbox access cover
6. Bracket-harness pre-SB.71-2662
6A. Bracket harness
7. Feedback link
8. Relay link
9. Seal ring
10. Bracket harness - S B 71-2662

45485

R R R L.H. gearbox access cover - Removal/Installation - Engines without A.I.D.S. Fig.401 (Sheet 1) 2

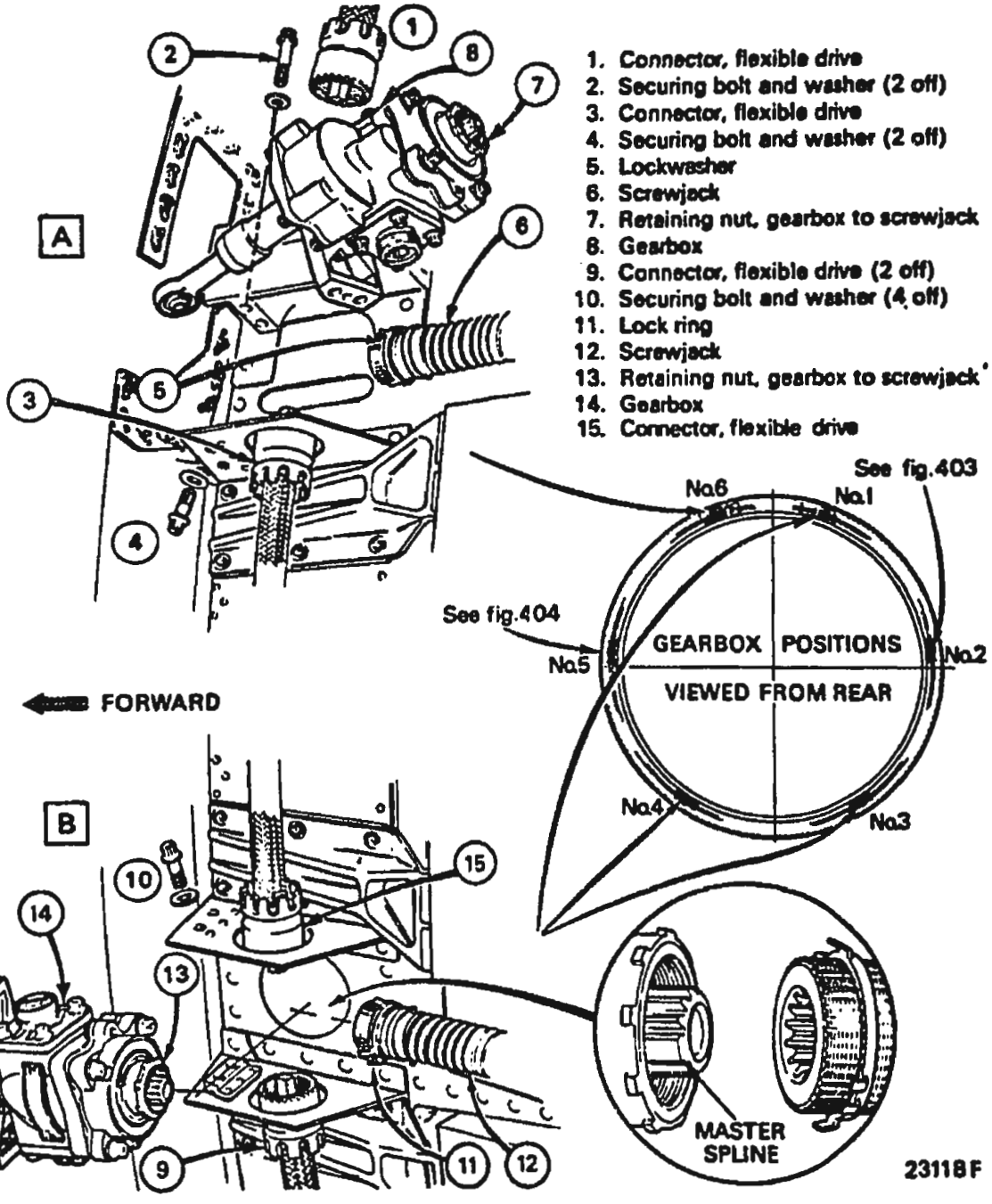


1. Bolt(4off)
2. Feedback gearbox cover
3. Feedback gearbox slider
4. Bolt(36off)
5. L.H.gearbox access cover
6. Bracket-harness(2off)-pre-S.B.71-2662
6A. Bracket-harness
7. Feedback link
8. Relay link
9. Seal ring
10. Bracket-harness-S.B.71-2662
11. Bracket A.I.D.S.loom S.B.71-2662

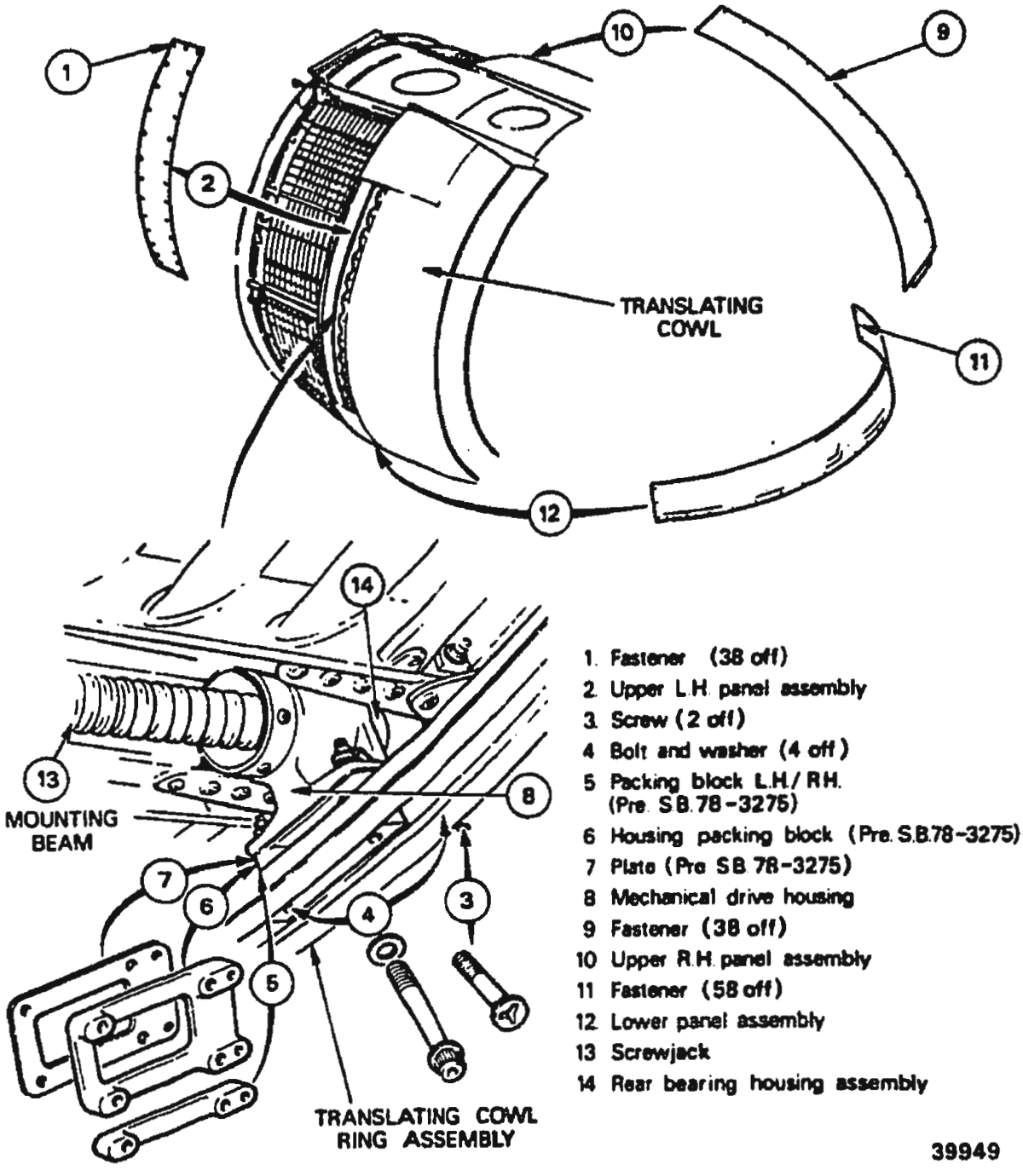
45486

R L.H. gearbox access cover - Removal/Installation -
R Engines with A.I.D.S.
R Fig.401 (Sheet 2)

2



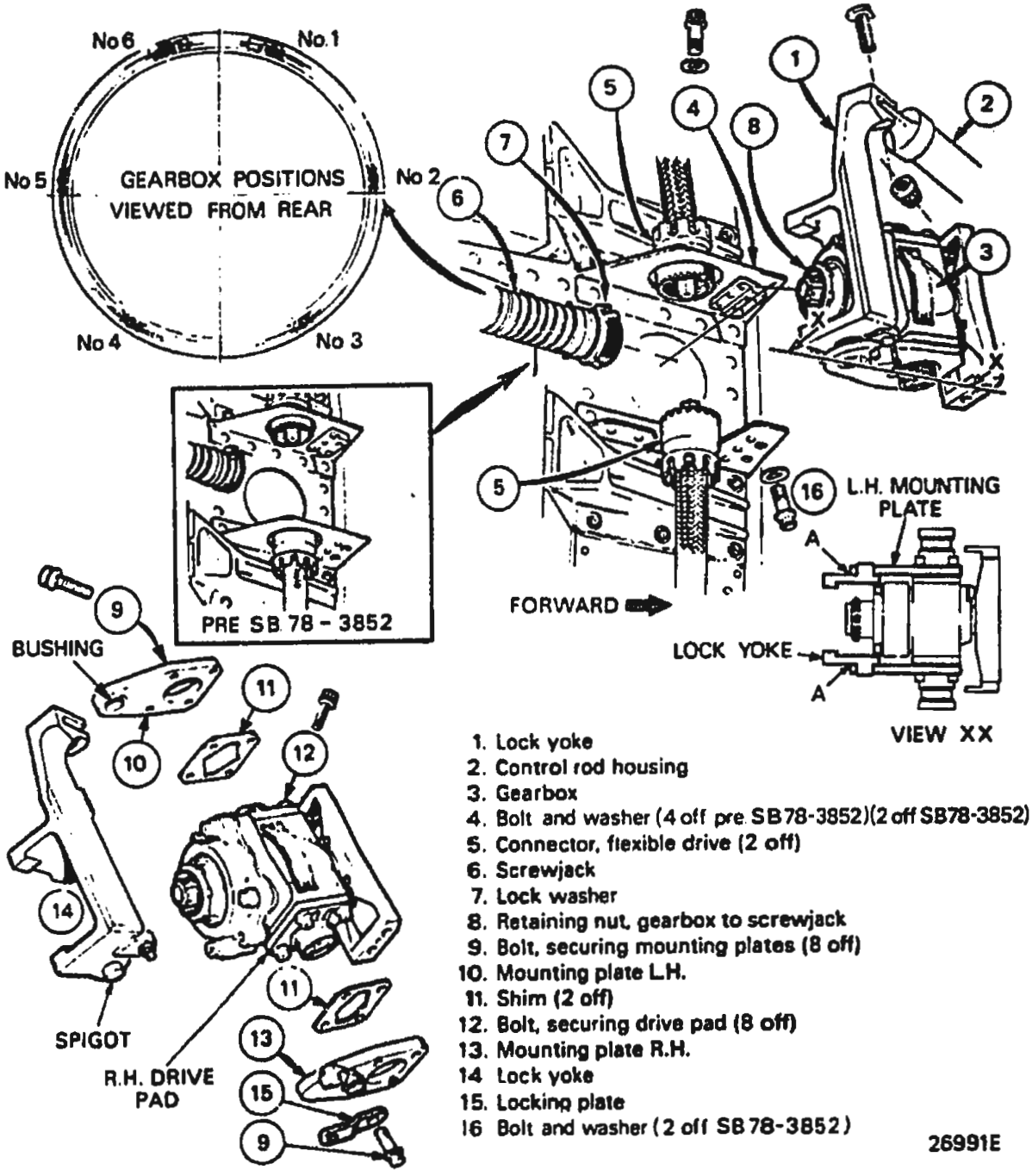
Translating cowl gearbox - Removal/Installation
Fig.402 (Sheet 1)



1. Fastener (38 off)
2. Upper L.H. panel assembly
3. Screw (2 off)
4. Bolt and washer (4 off)
5. Packing block L.H./R.H. (Pre. S.B.78-3275)
6. Housing packing block (Pre. S.B.78-3275)
7. Plate (Pre S.B. 78-3275)
8. Mechanical drive housing
9. Fastener (38 off)
10. Upper R.H. panel assembly
11. Fastener (58 off)
12. Lower panel assembly
13. Screwjack
14. Rear bearing housing assembly

39949

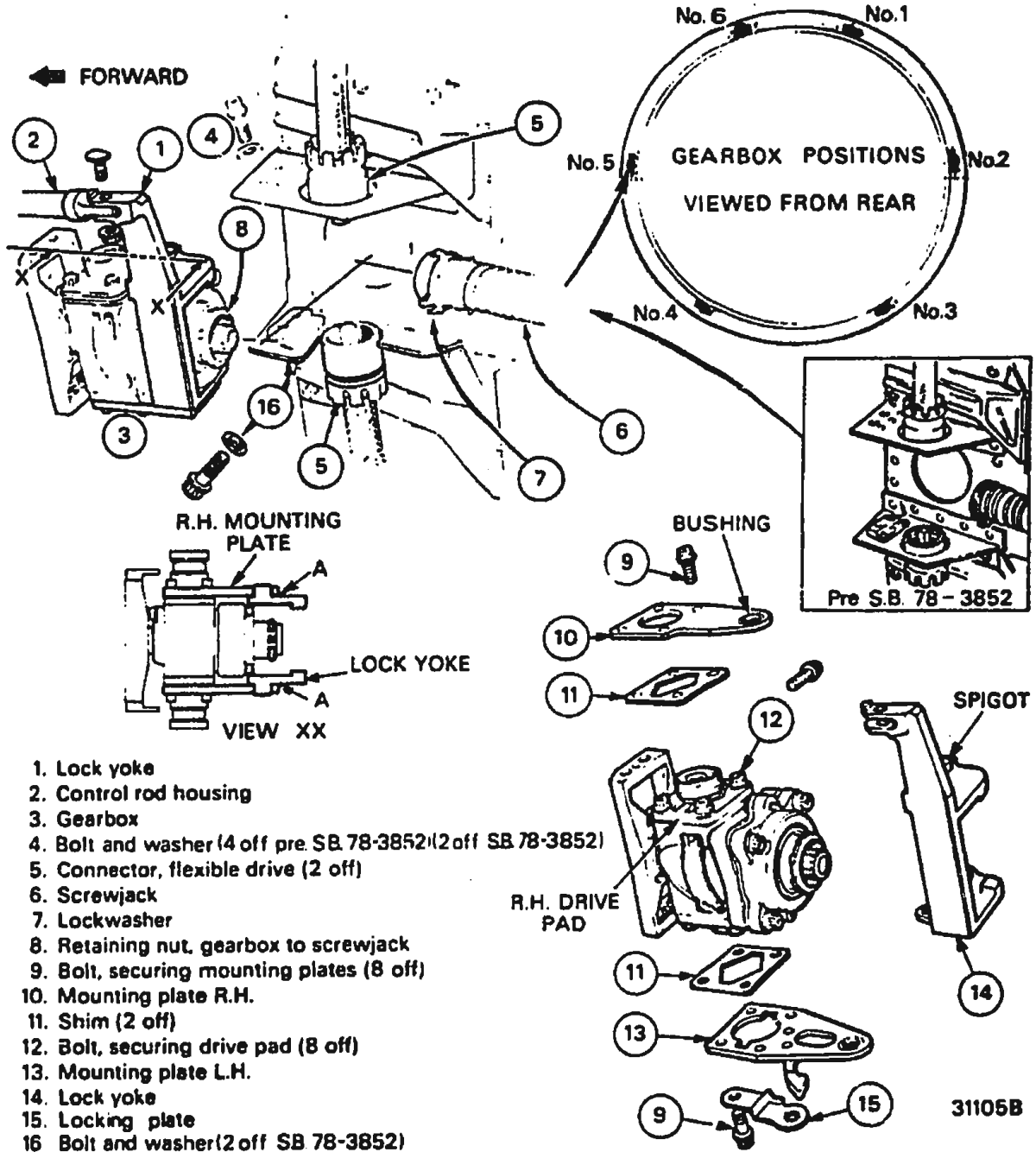
Translating cowl gearbox - Removal/Installation
Fig.402 (Sheet 2)



1. Lock yoke
2. Control rod housing
3. Gearbox
4. Bolt and washer (4 off pre SB78-3852)(2 off SB78-3852)
5. Connector, flexible drive (2 off)
6. Screwjack
7. Lock washer
8. Retaining nut, gearbox to screwjack
9. Bolt, securing mounting plates (8 off)
10. Mounting plate L.H.
11. Shim (2 off)
12. Bolt, securing drive pad (8 off)
13. Mounting plate R.H.
14. Lock yoke
15. Locking plate
16. Bolt and washer (2 off SB78-3852)

26991E

R.H. centre gearbox and locking mechanism - Removal/Installation
Fig.403



1. Lock yoke
2. Control rod housing
3. Gearbox
4. Bolt and washer (4 off pre SB 78-3852) (2 off SB 78-3852)
5. Connector, flexible drive (2 off)
6. Screwjack
7. Lockwasher
8. Retaining nut, gearbox to screwjack
9. Bolt, securing mounting plates (8 off)
10. Mounting plate R.H.
11. Shim (2 off)
12. Bolt, securing drive pad (8 off)
13. Mounting plate L.H.
14. Lock yoke
15. Locking plate
16. Bolt and washer (2 off SB 78-3852)

L.H. centre gearbox and locking mechanism – Removal/Installation
Fig.404

1

TRANSLATING COWL GEARBOX - INSPECTION/CHECK

1. Check Translating Cowl Gearbox

   A. Operate thrust reverser to reverse thrust position (Ref. 78-30-00, Adjustment/Test)

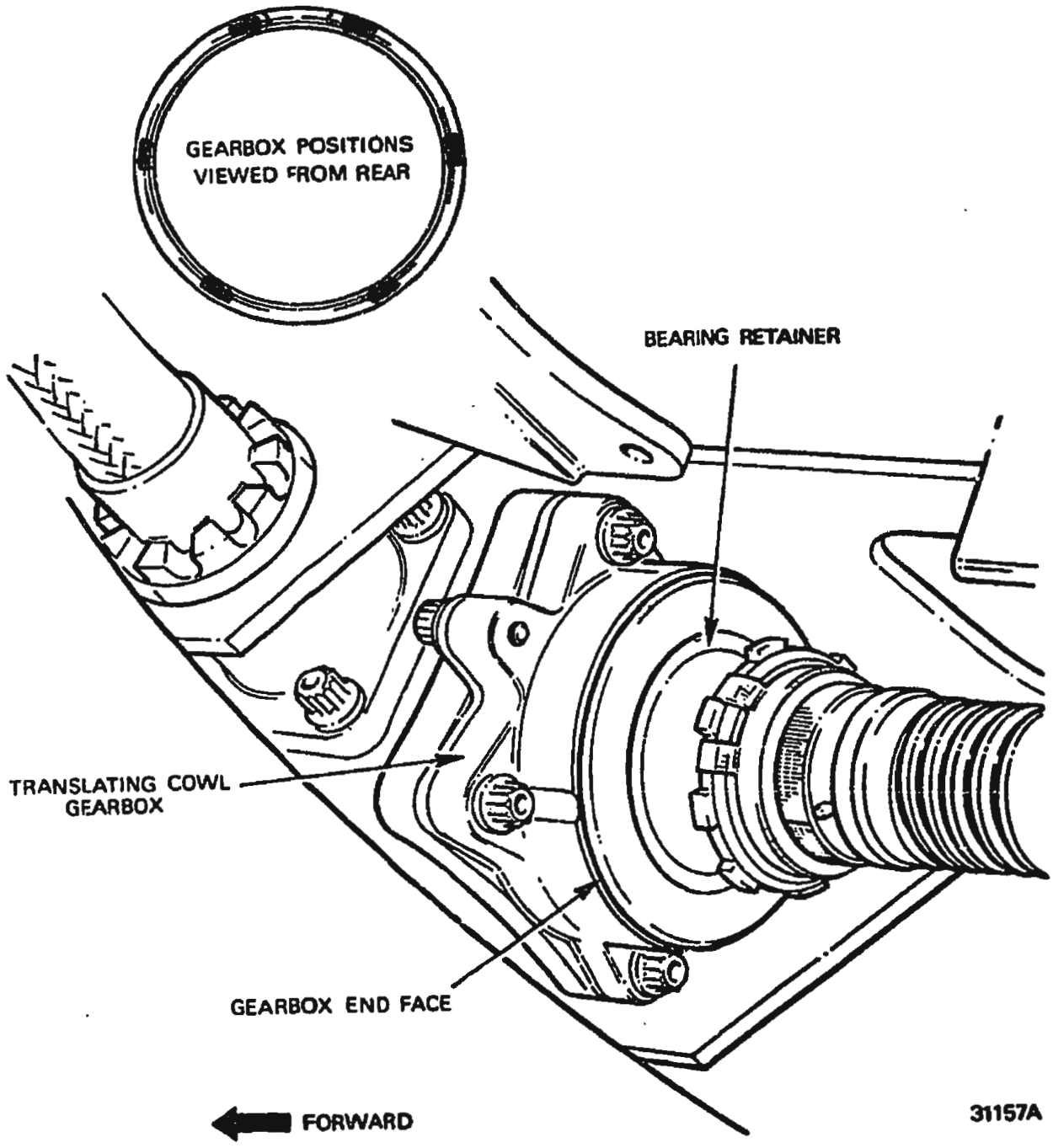
   B. Manually cycle thrust reverser (Ref. 78-30-00, Adjustment/Test) approximately 0.5in. (12,7 mm.) towards forward thrust position in order to place loading on bevel gear retaining bolt and associated parts.

   C. WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS. Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00, Servicing).

   D. Refer to fig.601, check gearbox bearing retainer does not protrude beyond end face of gearbox. If bearing retainer is found to protrude, this indicates rearward movement of the gearbox output shaft due to loosening of bevel gear retaining bolt and the gearbox must be replaced (Ref. Removal/Installation).

   E. Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

   F. Operate thrust reverser to forward thrust position (Ref. 78-30-00, Adjustment/Test).



Translating cowl gearbox inspection/check
Fig.601

TRANSLATING COWL INTERLOCK GEARBOX - MAINTENANCE PRACTICES

1. Removal/Installation of Translating Cowl Interlock Gearbox

   A. The removal/installation sequence for the interlock gearbox is detailed and illustrated in 78-31-17.

TRANSLATING COWL SCREWJACK - MAINTENANCE PRACTICES

R 1. Remove Translating Cowl Screwjacks

R The procedure for removing individual translating cowl screwjacks
R is contained in the following paragraphs:

R Screwjack connected to L.H. upper (No.6) gearbox - Paragraph A.

R Screwjack connected to R.H. upper (No.1) gearbox - Paragraph B.

R Screwjack connected to R.H. centre (No.2) gearbox - Paragraph C.

R Screwjack connected to L.H. centre (No.5) gearbox - Paragraph D.

R Screwjack connected to lower R.H. (No.3) or L.H. (No.4) gearbox
R - Paragraph E.

R NOTE: The translating cowl gearboxes are numerically identified
R viewed from the rear.

R In the event of a thrust reverser system failure that prevents
R thrust reverser operation to reverse thrust position or the
R translating cowl being manually cycled rearwards, carry out
R manual traversing procedure (Ref. 78-31-07).

R For ease of reference, all illustrations are grouped together
R at the end of this section.

Service Bulletin referred to:

S.B.78-3275 - Guide Rail Mounting and Nut Housing Shims Revised and Secured
R S.B.78-3852 - Access to Centre Gearbox Lock Latch
R S.B.78-3875 - Sectional Firewall and Pressure Cylinder Assembly
R S.B.78-3882 - Detachable Firewall and Pressure Cylinder with Removable Sections Giving Access to Feedback Gearbox
R AiResearch S.B.121190-78-1284 Mod.V4716 (R.R. S.B.78-4892) - Introduction of Spannering Flats on Screwjack

Referenced Procedures

R	71-00-00	Power Plant - Adjustment/Test
	71-11-01	L.H. Hinged Cowl - Removal/Installation
	71-11-02	R.H. Hinged Cowl - Removal/Installation
	71-12-01	L.H. and R.H. Lower Hinged Cowl - Removal/ Installation
	71-12-03	L.H. and R.H. Mid Fixed Cowl - Removal/ Installation
	71-12-05	L.H. and R.H. Upper Hinged Cowl - Removal/ Installation
	71-30-01	Engine Firewall - Removal/Installation
R	78-30-00	Thrust Reverser - Servicing and Adjustment/Test
R	78-31-07	Translating Cowl - Maintenance Practices
R	78-31-17	Translating Cowl Gearbox - Removal/Installation

Illustrated Parts Catalogue References

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

R	71-30-01	Engine Firewall
R	76-11-02	Engine Power and Thrust Reverser Linkage
	78-31-07	Translating Cowl Panels and Guide Rails
R	78-31-08	Engine Mounted Translating Cowl Flexible Drives
R	78-31-09	Thrust Reverser Mounted Translating Cowl Flexible Drives
	78-31-17	Translating Cowl Gearbox Installation
	78-31-19	Translating Cowl Screwjacks Installation
R	78-31-36	Thrust Reverser Mounted Translating Cowl Locking Mechanism
R	78-31-41	Engine Mounted Translating Cowl Locking Mechanism

R A. Remove Translating Cowl Screwjack Connected to Upper L.H.
R (feedback) Gearbox (No.6)

(1) Equipment required:

HU20163/1 Socket spanner
1702148)Screwdriver, special
(AiResearch No.287925-1))

(2) Operate thrust reverser to reverse thrust position (Ref. 78-30-00, Adjustment/Test).

(3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref. 78-30-00, Servicing).

R (4) No.1 and No.3 engines

R (a) Remove L.H. and R.H. hinged cowls, 413A or 423A (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (5) No.2 engine

R (a) Remove L.H. and R.H. upper hinged cowls, 433DL
R and 434DR (Ref. 71-12-05).

R (b) Remove L.H. and R.H. lower hinged cowls, 433AL
R and 434AR (Ref. 71-12-01).

R (c) Remove L.H. and R.H. mid fixed cowls, 433CL and
R 434CR (Ref. 71-12-03).

R (6) On engines without S.B.78-3875 and S.B.78-3882, remove
R firewall and pressure cylinder assembly (Ref. 71-30-01).

R (7) On engines with S.B.78-3875, remove upper L.H.
R detachable firewall assembly and upper L.H. pressure
R cylinder (Ref. 71-30-01).

R (8) On engines with S.B.78-3882, remove upper L.H.
R detachable firewall and upper L.H. pressure cylinder
R access panels (Ref. 71-30-01).

R (9) Refer to fig.201, release fasteners (1) and remove
R upper L.H. panel assembly (2).

R (10) Refer to fig.202 detail A, disconnect feedback link
R (11) as detailed in 76-11-00.

R (11) Using socket spanner, disconnect connectors (1) and (2).

R (12) Using special screwdriver, disengage lockwasher (3) from retaining nut (4), slide lockwasher rearward and locate in screwjack (7) recess for security then, using socket spanner, slacken retaining nut.

R (13) Refer to fig.203, on engines without S.B.78-3275, remove screws (2) and bolts and washers (3) from translating cowl ring assembly and mechanical drive housing (7). Remove packing block (4) and plate (6) and retain for fitment with new screwjack.

R (14) On engines with S.B.78-3275, remove screws (2) and bolts and washers (3) from translating cowl ring assembly and mechanical drive housing (7).

R NOTE: On engines with S.B.78-3275, packing block (4) and plate (6) are fitted to the translating cowl ring assemblies.

R (15) Refer to fig.202 detail A, remove bolts and washers (5).

R (16) CAUTION: RETAIN SCREWJACK (7) IN THE HORIZONTAL POSITION. DO NOT ALLOW THE WEIGHT OF THE SCREWJACK TO BE SUSPENDED ON THE REAR BEARING.
Fully unscrew retaining nut (4) and release gearbox (6) from screwjack (7). Push gearbox forward to limit permitted by inner firewall assembly and push screwjack rearward to limit permitted by screwjack rear bearing.

R (17) Withdraw screwjack (7) from thrust reverser case and remove lockwasher (3) from screwjack. Retain lockwasher for fitment with new screwjack.

R (18) Fit approved blanks to all exposed apertures and connectors.

R B. Remove Translating Cowl Screwjack Connected to Upper R.H. (No.1) Gearbox

R (1) Equipment required:

R HU20163/1	Socket spanner
R 1702148 (AiResearch No.287925-1)	Screwdriver, special

R (2) Operate thrust reverser to reverse thrust position
R (Ref. 78-30-00, Adjustment/Test).

R (3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN
R REVERSE THRUST POSITION WHILE WORK IS IN
R PROGRESS.
R Deactivate and tag thrust reverser and associated
R systems and fit thrust reverser locks (Ref. 78-30-00,
R Servicing).

R (4) No.1 and No.3 engines

R (a) Remove L.H. and R.H. hinged cowls, 413A or 423A
R (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (5) No.2 engine

R (a) Remove L.H. and R.H. upper hinged cowls, 433DL
R and 434DR (Ref. 71-12-05).

R (b) Remove L.H. and R.H. lower hinged cowls, 433AL
R and 434AR (Ref. 71-12-01).

R (c) Remove L.H. and R.H. mid fixed cowls, 433CL and
R 434CR (Ref. 71-12-03).

R (6) On engines without S.B.78-3875, remove firewall and
R pressure cylinder assembly (Ref. 71-30-01).

R (7) On engines with S.B.78-3875, remove upper R.H.
R detachable firewall assembly and upper R.H. pressure
R cylinder (Ref. 71-30-01).

R (8) Refer to fig.201, release fasteners (3) and remove
R upper R.H. panel assembly (4).

R (9) Using socket spanner, disconnect connectors (7) and (8).

R (10) Using special screwdriver, disengage lockwasher (9)
R from retaining nut (10), slide lockwasher rearward and
R locate in screwjack (11) recess for security then,
R using socket spanner, slacken retaining nut.

R (11) Refer to fig.203, on engines without S.B.78-3275, remove screws (2) amd bolts and washers (3) from translating cowl ring assembly and mechanical drive housing (7). Remove packing block (4) and plate (6) and retain for fitment with new screwjack.

R (12) On engines with S.B.78-3275, remove screws (2) and bolts and washers (3) from translating cowl ring assembly and mechanical drive housing (7).

R NOTE: On engines with S.B.78-3275, packing block (4) and plate (6) are fitted to the translating cowl ring assemblies.

R (13) Refer to fig.201, remove bolts and washers (12).

R (14) CAUTION: RETAIN SCREWJACK (11) IN THE HORIZONTAL POSITION. DO NOT ALLOW THE WEIGHT OF THE SCREWJACK TO BE SUSPENDED ON THE REAR BEARING.
Fully unscrew retaining nut (10) and release gearbox (13) from screwjack (11). Push screwjack rearward to limit permitted by screwjack rear bearing then remove gearbox and retain fit fitment with new screwjack.

R (15) Withdraw screwjack (11) from thrust reverser case and remove lockwasher (9) from screwjack. Retain lockwasher for fitment with new screwjack.

R (16) Fit approved blanks to all exposed apertures and connectors.

R C. Remove Translating Cowl Screwjack Connected to R.H. Centre (No.2) Gearbox

R (1) Equipment required:

HU20163/1	Socket spanner
1702148 (AiResearch No.287925-1)	Screwdriver, special

R (2) Operate thrust reverser to reverse thrust position (Ref. 78-30-00, Adjustment/Test).

R (3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref. 78-30-00, Servicing).

R (4) No.1 and No.3 engines

R (a) Remove L.H. and R.H. hinged cowls, 413A or 423A (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (5) No.2 engine

R (a) Remove L.H. and R.H. upper hinged cowls, 433DL and 434DR (Ref. 71-12-05).

R (b) Remove L.H. and R.H. lower hinged cowls, 433AL and 434AR (Ref. 71-12-01).

R (c) Remove L.H. and R.H. mid fixed cowls, 433CL and 434CR (Ref. 71-12-03).

R (6) On engines without S.B.78-3875, remove firewall and pressure cylinder assembly (Ref. 71-30-01).

R (7) On engines with S.B.78-3875, remove upper R.H. detachable firewall assembly and upper R.H. pressure cylinder (Ref. 71-30-01).

R (8) Refer to fig.201, release fasteners (3) and remove upper R.H. panel assembly (4).

R (9) Refer to fig.202 detail B, disconnect lock yoke (8) from control rod housing (9).

R (10) Using socket spanner, disconnect connectors (1) and (2).

R (11) Using special screwdriver, disengage lockwasher (3) from retaining nut (4), slide lockwasher rearward and locate in screwjack (7) recess for security then, using socket spanner, slacken retaining nut.

R (12) Refer to fig.203, on engines without S.B.78-3275, remove screws (2) and bolts and washers (3) from translating cowl ring assembly and mechanical drive housing (7). Remove packing block (5) and plate (6) and retain for fitment with new screwjack.

R (13) On engines with S.B.78-3275, remove screws (2) and bolts and washers (3) from translating cowl ring assembly and mechanical drive housing (7).

R NOTE: On engines with S.B.78-3275, packing block (5) and plate (6) are fitted to the translating cowl ring assemblies.

R (14) Refer to fig.202 detail B, on engines without S.B.78-3852, remove bolts and washers (5).

R (15) On engines with S.B.78-3852, remove bolts and washers (5) and bolts and washers (10).

R (16) CAUTION: RETAIN SCREWJACK (7) IN THE HORIZONTAL POSITION. DO NOT ALLOW THE WEIGHT OF THE SCREWJACK TO BE SUSPENDED ON THE REAR BEARING.
Fully unscrew retaining nut (4) and release gearbox (6) from screwjack (7). Push screwjack rearward to limit permitted by screwjack rear bearing then remove gearbox and retain for fitment with new screwjack.

R (17) Withdraw screwjack (7) from thrust reverser case and remove lockwasher (3) from screwjack. Retain lockwasher for fitment with new screwjack.

R (18) Fit approved blanks to all exposed apertures and connectors.

R D. Remove Translating Cowl Screwjack Connected to L.H. Centre (No.5) Gearbox

R (1) Equipment required:

R HU20163/1	Socket spanner
R 1702148	)Screwdriver, special
R (AiResearch No.287925-1)	)

R (2) Operate thrust reverser to reverse thrust position
R (Ref. 78-30-00, Adjustment/Test).

R (3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN
R REVERSE THRUST POSITION WHILE WORK IS IN
R PROGRESS.
R Deactivate and tag thrust reverser and associated
R systems and fit thrust reverser locks (Ref. 78-30-00,
R Servicing).

R (4) No.1 and No.3 engines

R (a) Remove L.H. and R.H. hinged cowls, 413A or 423A
R (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (5) No.2 engine

R (a) Remove L.H. and R.H. upper hinged cowls, 433DL
R and 434DR (Ref. 71-12-05).

R (b) Remove L.H. and R.H. lower hinged cowls, 433AL
R and 434AR (Ref. 71-12-01).

R (c) Remove L.H. and R.H. mid fixed cowls, 433CL and
R 434CR (Ref. 71-12-03).

R (6) On engines without S.B.78-3875, remove firewall and
R pressure cylinder assembly (Ref. 71-30-01).

R (7) On engines with S.B.78-3875, remove upper L.H.
R detachable firewall assembly and upper L.H. pressure
R cylinder (Ref. 71-30-01).

R (8) Refer to fig.201, release fasteners (1) and remove
R upper L.H. panel assembly (2).

R (9) Refer to fig.202 detail C, disconnect lock yoke (8)
R from control rod housing (9).

R (10) Using socket spanner, disconnect connectors (1) and (2).

R (11) Using special screwdriver, disengage lockwasher (3)
R from retaining nut (4), slide lockwasher rearward and
R locate in screwjack (7) recess for security then, using
R socket spanner, slacken retaining nut.

R (12) Refer to fig.203, on engines without S.B.78-3275, remove screws (2) and bolts and washers (3) from translating cowl ring assembly and mechanical drive housing (7). Remove packing block (5) and plate (6) and retain for fitment with new screwjack.

R (13) On engines with S.B.78-3275, remove screws (2) and bolts and washers (3) from translating cowl ring assembly and mechanical drive housing (7).

R NOTE: On engines with S.B.78-3275, packing block (5) and plate (6) are fitted to the translating cowl ring assemblies.

R (14) Refer to fig.202 detail C, on engines without S.B.78-3852, remove bolts and washer (5).

R (15) On engines with S.B.78-3852, remove bolts and washers (5) and bolts and washers (10).

R (16) CAUTION: RETAIN SCREWJACK (7) IN THE HORIZONTAL POSITION. DO NOT ALLOW THE WEIGHT OF THE SCREWJACK TO BE SUSPENDED ON THE REAR BEARING.
Fully unscrew retaining nut (4) and release gearbox (6) from screwjack (7). Push screwjack rearward to limit permitted by screwjack rear bearing then remove gearbox and retain for fitment with new screwjack.

R (17) Withdraw screwjack (7) from thrust reverser case and remove lockwasher (3) from screwjack. Retain lockwasher for fitment with new screwjack.

R (18) Fit approved blanks to all exposed apertures and connectors.

R E. Remove Translating Cowl Screwjack Connected to Lower R.H. No.3 or L.H. (No.4) Gearbox

R (1) Equipment required:

R HU20163/1	Socket spanner
R 1702148 (AiResearch No.287925-1)	Screwdriver, special

R (2) Operate thrust reverser to reverse thrust position
R (Ref. 78-30-00, Adjustment/Test).

R (3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN
R REVERSE THRUST POSITION WHILE WORK IS IN
R PROGRESS.
R Deactivate and tag thrust reverser and associated
R systems and fit thrust reverser locks (Ref. 78-30-00,
R Servicing).

R (4) No.1 and No.3 engines

R (a) Remove L.H. and R.H. hinged cowls, 413A or 423A
R (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (5) No.2 engine

R (a) Remove L.H. and R.H. upper hinged cowls, 433DL
R and 434DR (Ref. 71-12-05).

R (b) Remove L.H. and R.H. lower hinged cowls, 433AL
R and 434AR (Ref. 71-12-01).

R (c) Remove L.H. and R.H. mid fixed cowls, 433CL and
R 434CR (Ref. 71-12-03).

R (6) On engines without S.B.78-3875, remove firewall and
R pressure cylinder assembly (Ref. 71-30-01).

R (7) On engines with S.B.78-3875, remove lower fixed
R firewall and pressure cylinder assembly (Ref. 71-30-01).

R (8) Refer to fig.201, release fasteners (5) and remove
R lower panel assembly (6).

R (9) Using socket spanner, disconnect connectors (7) and (8).

R (10) Using special screwdriver, disengage lockwasher (9)
R from retaining nut (10), slide lockwasher rearward and
R locate in screwjack (11) recess for security then, using
R socket spanner, slacken retaining nut.

R (11) Refer to fig.203, on engines without S.B.78-3275, remove screws (2) and bolts and washers (3) from translating cowl ring assembly and mechanical drive housing (7). Remove packing block (5) and plate (6) and retain for fitment with new screwjack.

R (12) On engines with S.B.78-3275, remove screws (2) and bolts and washers (3) from translating cowl ring assembly and mechanical drive housing (7).

R NOTE: On engines with S.B.78-3275, packing block (5) and plate (6) are fitted to the translating cowl ring assemblies.

R (13) Refer to fig.201, remove bolts and washers (12).

R (14) CAUTION: RETAIN SCREWJACK (11) IN THE HORIZONTAL POSITION. DO NOT ALLOW THE WEIGHT OF THE SCREWJACK TO BE SUPPENDED ON THE REAR BEARING. Fully unscrew retaining nut (10) and release gearbox (13) from screwjack (11). Push screwjack rearward to limit permitted by screwjack rear bearing then remove gearbox and retain for fitment with new screwjack.

R (15) Withdraw screwjack (11) from thrust reverser case and remove lockwasher (9) from screwjack. Retain lockwasher for fitment with new screwjack.

R (16) Fit approved blanks to all exposed apertures and connectors.

R 2. Install Translating Cowl Screwjacks

R A. Install Translating Cowl Screwjack Connected to Upper L.H. (feedback) Gearbox (No.6)

R (1) Equipment required:

R Clean, stiff-bristled brush
1702141 (AiResearch No.287532-1-1))Tang wrench
1702148 (AiResearch No.287925-1)) Screwdriver, special

R (2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
R Degreasing fluid (Inhibiting and stabilized 1.1.1. trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21
R Jointing compound	DTD.900/ 4586 (Hylomar light)	-	426A

R (3) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation R 1.A.(3).

R (4) Remove blanks from connectors and apertures.

R (5) WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE R VENTILATION AND AVOID SKIN CONTACT AND R INHALING THE VAPOUR.
R On engines without S.B.78-3875 and S.B.78-3882, cold R liquid degrease mating faces of upper L.H. and R.H. R detachable firewall assemblies, pressure clyinder and R firewall assembly, firewall extensions (No.2 engine R only), inner firewall, translating cowl and upper L.H. R panel assembly and allow to dry.

R On engines with S.B.78-3875, cold liquid degrease mating R faces of upper L.H. detachable firewall assembly, upper R L.H. pressure cylinder, L.H. firewall extension (No.2 R engine only), inner firewall, translating cowl and R upper L.H. panel assembly and allow to dry.

R On engines with S.B.78-3882, cold liquid degrease mating R faces of upper L.H. detachable firewall access panel, R upper L.H. pressure cylinder access panel, L.H. firewall R extension (No.2 engine only), inner firewall, translating R cowl and upper L.H. panel assembly and allow to dry.

R (6) On engines without S.B.78-3875 and S.B.78-3882, brush apply a thin film of jointing compound to mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

R (7) On engines with S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. detachable firewall assembly, upper L.H. pressure cylinder, L.H. firewall extension (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

R (8) On engines with S.B.78-3882, brush apply a thin film of jointing compound to mating faces of upper L.H. detachable firewall access panel, upper L.H. pressure cylinder access panel, firewall extension (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

R (9) CAUTION: REFER TO FIG.203, RETAIN SCREWJACK (8) IN THE HORIZONTAL POSITION. DO NOT ALLOW THE WEIGHT OF THE SCREWJACK TO BE SUSPENDED ON THE REAR BEARING.
Insert screwjack (8) (non threaded end leading) into thrust reverser case mounting beam. Locate screwjack in rear bearing housing (1) and push fully home.

R (10) Refer to fig.202 detail A, slide lockwasher (3) over screwjack (7) threaded end and locate in screwjack recess for security.

R (11) Slide gearbox (6) rearward and engage gearbox master spline with screwjack (7) master spline then push gearbox fully home. Screw retaining nut (4) onto screwjack threads and tighten sufficiently to eliminate independent endfloat of the screwjack. Do not torque tighten retaining nut at this stage.

R (12) Fit and secure bolts and washers (5).

R (13) Refer to fig.203, depress slider plate (9) and using
R feeler gauges, check that clearance A between slider
R plate and mounting beam trackway is within the limits
R 0.004 to 0.047in. (0,102 to 1,194 mm.).

R On engines without AiResearch S.B.121190-78-1284
R (R.R. S.B.78-4892), turn screwjack (8) by hand to
R reposition mechanical drive housing (7) and check at
R further two positions along trackway that clearance
R A is within the limits stated.

R On engines with AiResearch S.B.121190-78-1284 (R.R.
R S.B.78-4892), using spannering flats, turn screwjack
R (8) to reposition mechanical drive housing (7) and
R check at a further two positions along trackway that
R clearance A is within the limits stated.

R If clearance A is not within the limits stated, proceed
R as follows:

R (a) Refer to fig.202 detail A, remove bolts and
R washers (5).

R (b) CAUTION: RETAIN SCREWJACK (7) IN THE HORIZONTAL
R POSITION. DO NOT ALLOW THE WEIGHT OF
R THE SCREWJACK TO BE SUSPENDED ON THE
R REAR BEARING.
R Fully unscrew retaining nut (4) and release
R gearbox (6) from screwjack (7). Push gearbox
R forward to limit permitted by inner firewall
R assembly and push screwjack rearward to limit
R permitted by screwjack rear bearing.

R (c) Withdraw screwjack (7) from thrust reverser case
R and remove lockwasher (3) from screwjack. Retain
R lockwasher for refitment.

R (d) Refer to fig.203, disengage slider plate (9)
R spring clips from mechanical drive housing (7)
R then remove slider plate, slider plate bearing
R liner (10), shim(s)(11) and compression plate (12).

R (e) Calculate and select (to a maximum of two shims) thickness of shim(s)(11) necessary to bring clearance A within the limits stated.

R (f) Fit compression plate (12) into mechanical drive housing (7) recess followed by selected shim(s) (11), slider plate bearing liner (10) (chamfered end leading) and slider plate (9). Engage slider plate spring clips with mechanical drive housing.

R (g) Effect operations 2.A.(9) through (12) then re-check clearance A at three positions.

R (14) CAUTION: REFER TO FIG.202 DETAIL A, ON ENGINES WITHOUT AIRESEARCH S.B.121190-78-1284 (R.R. S.B.78-4892), DO NOT USE WATER PUMP PLIERS OR SIMILAR METAL GRIPS TO RESTRAIN SCREWJACK (7) WHEN TORQUE TIGHTENING RETAINING NUT (4).

On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), use screwjack (7) spannering flats to restrain screwjack, when torque tightening retaining nut (4).

R Using tang wrench, torque tighten retaining nut (4) to 80-100 lbs.ins. (9.04-11.31 Nm.).

R (15) CAUTION: IN ORDER TO PREVENT SEVERE DAMAGE TO THE GEARBOX (6) AND SCREWJACK (7) SPLINES, IT IS ESSENTIAL THAT THERE IS FULL ENGAGEMENT OF THE SPLINES WITH NO INDEPENDENT END FLOAT OF THE SCREWJACK.

Check screwjack (7) for endfloat. If endfloat exists, fully unscrew retaining nut (4), ensure full engagement of gearbox (6) and screwjack splines, screw retaining nut onto screwjack threads and torque tighten then check screwjack for endfloat.

R (16) Slide lockwasher (3) forward to abut retaining nut (4) and using special screwdriver, engage lockwasher tabs with retaining nut slots.

R (17) Refer to fig.203, on engines without AiResearch
R S.B.121190-78-1284 (R.R. S.B.78-4892), turn screwjack
R (8) by hand until mechanical drive housing (7) bolt
R holes align with translating cowl ring assembly bolt
R holes.

R (18) On engines with AiResearch S.B.121190-78-1284 (R.R.
R S.B.78-4892), using spannering flats, turn screwjack
R (8) until mechanical drive housing (7) bolt holes align
R with translating cowl ring assembly bolt holes.

R (19) Measure and record the distance between mechanical
R drive housing (7) rear face and rear bearing housing
R (1) forward face then measure the distance between
R same two points on remaining five screwjacks.

R The recorded distance must be within 0.0625in.
R (1,59 mm.) of the measurement obtained from remaining
R five screwjacks.

R If the recorded distance is not within the limit
R stated, adjust as follows:

R (a) On engines without AiResearch S.B.121190-78-1284
R (R.R. S.B.78-4892), turn screwjack (8) by hand
R until the distance between mechanical drive
R housing (7) rear face and rear bearing housing
R (1) forward face is within the limit stated of
R the measurement obtained from remaining five
R screwjacks.

R (b) On engines with AiResearch S.B.121190-78-1284
R (R.R. S.B.78-4892), using spannering flats, turn
R screwjack (8) until the distance between
R mechanical drive housing (7) rear face and rear
R bearing housing (1) forward face is within the
R limit stated of the measurement obtained from
R remaining five screwjacks.

R NOTE: One turn of screwjack moves mechanical
R drive housing by approximately 0.2in.
R (5,08 mm.).

R (20) On engines without S.B.78-3275, position packing
R block (4) and plate (6) then fit and secure bolts
R and washers (3) and screws (2).

R (21) On engines with S.B.78-3275, fit and secure bolts
R and washers (3) and screws (2).

R NOTE: On engines incorporating S.B.78-3275, packing
R block (4) and plate (6) are fitted to the
R translating cowl ring assemblies.

R (22) Refer to fig.201, fit upper L.H. panel assembly (2)
R and secure fasteners (1).

R (23) Refer to fig.202 detail A, connect flexible drive
R connectors (1) and (2) and using tang wrench, torque
R tighten to 40-50 lbs.in. (4.52-5.65 Nm.)

R (24) On engines without S.B.78-3875, install firewall and
R pressure cylinder assembly (Ref. 71-30-01).

R (25) On engines with S.B.78-3875, install upper L.H.
R pressure cylinder and upper L.H. detachable firewall
R assembly (Ref. 71-30-01).

R (26) On engines with S.B.78-3882, install upper L.H.
R pressure cylinder and upper L.H. detachable firewall
R assembly access panels (Ref. 71-30-01).

R (27) No.1 and No.3 engines

R (a) Fit L.H. and R.H. hinged cowls, 413A or 423A
R (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (28) No.2 engine

R (a) Fit L.H. and R.H. upper hinged cowls, 433DL and
R 434DR (Ref. 71-12-05).

R (b) Fit L.H. and R.H. lower hinged cowls, 433AL and
R 434AR (Ref. 71-12-01).

R (c) Fit L.H. and R.H. mid fixed cowls, 433CL and
R 434CR (Ref. 71-12-03).

R (29) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

R (30) Operate thrust reverser system to forward thrust position (Ref. 78-30-00, Adjustment/Test).

R (31) Refer to fig.202 detail A, connect feedback link (11) R as detailed in 76-11-00.

R (32) Before next flight, operationally test thrust reverser R system (Ref. 71-00-00).

R B. Install Translating Cowl Screwjack Connected to Upper R.H. R Gearbox (No.1)

R (1) Equipment required:

R Clean, stiff-bristled brush
R 1702141)Tang wrench
R (AiResearch No.287532-1-1))
R 1702148) Screwdriver, special
R (AiResearch No.287925-1))

R (2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Degreasing fluid (Inhibited and stabilized 1.1.1. trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21
Jointing compound	DTD.900/ 4586 (Hylomar light)	-	426A

R (3) Ensure thrust reverser is locked and systems are R deactivated and tagged as detailed in operation 1.B.(3).

R (4) Remove blanks from connectors and apertures.

R (5) WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE VENTILATION AND AVOID SKIN CONTACT AND INHALING THE VAPOUR.
On engines without S.B.78-3875, cold liquid degrease mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and upper R.H. panel assembly and allow to dry.

On engines with S.B.78-3875, cold liquid degrease mating faces of upper R.H. detachable firewall assembly, upper R.H. pressure cylinder, R.H. firewall extension (No.2 engine only), inner firewall, translating cowl and upper R.H. panel assembly and allow to dry.

R (6) On engines without S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and upper R.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

R (7) On engines with S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper R.H. detachable firewall assembly, upper R.H. pressure cylinder, R.H. firewall extension (No.2 engine only), inner firewall, translating cowl and upper R.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

R (8) CAUTION: REFER TO FIG.203, RETAIN SCREWJACK (8) IN THE HORIZONTAL POSITION. DO NOT ALLOW THE WEIGHT OF THE SCREWJACK TO BE SUSPENDED ON THE REAR BEARING.
Insert screwjack (8) (non threaded end leading) into thrust reverser case mounting beam. Locate screwjack in rear bearing housing (1) and push fully home.

R (9) Refer to fig.201, slide lockwasher (9) over screwjack
R (11) threaded end and locate in screwjack recess for
R security.

R (10) Locate gearbox (13) in mounting bracket on thrust
R reverser case with nameplate facing outwards from
R engine.

R (11) Engage gearbox (13) master spline with screwjack (11)
R master spline then push gearbox fully home. Screw
R retaining nut (10) onto screwjack threads and tighten
R sufficiently to eliminate independent endfloat of the
R screwjack. Do not torque tighten retaining nut at
R this stage.

R (12) Fit and secure bolts and washers (12).

R (13) Refer to fig.203, depress slider plate (9) and using
R feeler gauges, check that clearance A between slider
R plate and mounting beam trackway is within the limits
R 0.004 to 0.047in. (0,102 to 0,194 mm.).

R On engines without AiResearch S.B.121190-78-1284
R (R.R. S.B.78-4892), turn screwjack (8) by hand to
R reposition mechanical drive housing (7) and check at
R a further two positions along trackway that clearance
R A is within the limits stated.

R On engines with AiResearch S.B.121190-78-1284 (R.R.
R S.B.78-4892), using spannering flats, turn screwjack
R (8) to reposition mechanical drive housing (7) and
R check at a further two positions along trackway that
R clearance A is within the limits stated.

R If clearance A is not within the limits stated, proceed
R as follows:

R (a) Refer to fig.201, remove bolts and washers (12)
R and remove gearbox (13) together with screwjack
R (11).

R (b) Refer to fig.203, disengage slider plate (9) spring
R clips from mechanical drive housing (7) then remove
R slider plate, slider plate bearing liner (10),
R shim(s)(11) and compression plate (12).

R (c) Calculate and select (to a maximum of two shims)
R thickness of shim(s)(11) necessary to bring
R clearance A within the limits stated.

R (d) Fit compression plate (12) into mechanical drive
R housing (7) recess followed by selected shim(s)
R (11), slider plate bearing liner (10) (chamfered
R end leading) and slider plate (9). Engage
R slider plate spring clips with mechanical drive
R housing.

R (e) Refer to fig.201, insert screwjack (11) together
R with gearbox (13) (screwjack leading) into thrust
R reverser case mounting beam. Locate screwjack
R in rear bearing housing and (ensuring nameplate
R faces outwards from engine) gearbox in mounting
R bracket on thrust reverser case. Push screwjack
R and gearbox fully home.

R (f) Fit and secure bolts and washers (12).

R (g) Refer to fig.203, re-check clearance A at three
R positions.

R (14) CAUTION: REFER TO FIG.201, ON ENGINES WITHOUT
R AIRESEARCH S.B.121190-78-1284 (R.R.
R S.B.78-4892), DO NOT USE WATER PUMP PLIERS
R OR SIMILAR METAL GRIPS TO RESTRAIN
R SCREWJACK (11) WHEN TORQUE TIGHTENING
R RETAINING NUT (10).
R On engines with AiResearch S.B.121190-78-1284 (R.R.
R S.B.78-4892), use screwjack (11) spannering flats to
R restrain screwjack when torque tightening retaining
R nut (10).

R Using tang wrench, torque tighten retaining nut (10)
R to 80-100 lbs.ins. (9.04-11.31 Nm.).

R (15) CAUTION: IN ORDER TO PREVENT SEVERE DAMAGE TO THE GEARBOX (13) AND SCREWJACK (11) SPLINES, IT IS ESSENTIAL THAT THERE IS FULL ENGAGEMENT OF THE SPLINES WITH NO INDEPENDENT ENDFLOAT OF THE SCREWJACK.
Check screwjack (11) for endfloat. If endfloat exists, fully unscrew retaining nut (10), ensure full engagement of gearbox (13) and screwjack splines, screw retaining nut onto screwjack threads and torque tighten then check screwjack for endfloat.

R (16) Slide lockwasher (9) forward to abut retaining nut (10) and using special screwdriver, engage lockwasher tabs with retaining nut slots.

R (17) Refer to fig.203, on engines without AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), turn screwjack (8) by hand until mechanical drive housing (7) bolt holes align with translating cowl ring assembly bolt holes.

R (18) On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), using spannering flats, turn screwjack (8) until mechanical drive housing (7) bolt holes align with translating cowl ring assembly bolt holes.

R (19) Measure and record the distance between mechanical drive housing (7) rear face and rear bearing housing (1) forward face then measure the distance between same two points on remaining five screwjacks.

R The recorded distance must be within 0.0625in. (1,59 mm.) of the measurement obtained from remaining five screwjacks.

R If the recorded distance is not within the limit stated, adjust as follows:

R (a) On engines without AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), turn screwjack (8) by hand until the distance between mechanical drive housing (7) rear face and rear bearing housing (1) forward face is within the limit stated of the measurement obtained from remaining five screwjacks.

(b) On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), using spannering flats, turn screwjack (8) until the distance between mechanical drive housing (7) rear face and rear bearing housing (1) forward face is within the limit stated of the measurement obtained from remaining five screwjacks.

NOTE: One turn of screwjack moves mechanical drive housing by approximately 0.2in. (5,08 mm.).

(20) On engines without S.B.78-3275, position packing block (4) and plate (6) then fit and secure bolts and washers (3) and screws (2).

(21) On engines with S.B.78-3275, fit and secure bolts and washers (3) and screws (2).

NOTE: On engines with S.B.78-3275, packing block (4) and plate (6) are fitted to the translating cowl ring assemblies.

(22) Refer to fig.201, fit upper R.H. panel assembly (4) and secure fasteners (3).

(23) Connect flexible drive connectors (7) and (8) and using tang wrench, torque tighten to 40-50 lbs.ins. (4.52-5.65 Nm.).

(24) On engines without S.B.78-3875, install firewall and pressure cylinder assembly (Ref. 71-30-01).

(25) On engines with S.B.78-3875, install upper R.H. pressure cylinder and upper R.H. detachable firewall assembly (Ref. 71-30-01).

(26) No.1 and No.3 engines

(a) Fit L.H. and R.H. hinged cowls, 413A or 423A (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (27) No.2 engine

R (a) Fit L.H. and R.H. upper hinged cowls, 433DL and
R 434DR (Ref. 71-12-05).

R (b) Fit L.H. and R.H. lower hinged cowls, 433AL and
R 434AR (Ref. 71-12-01).

R (c) Fit L.H. and R.H. mid fixed cowls, 433CL and
R 434CR (Ref. 71-12-03).

R (28) Unlock and reactivate thrust reverser and associated
R systems (Ref. 78-30-00, Servicing).

R (29) Operate thrust reverser to forward thrust position
R (Ref. 78-30-00, Adjustment/Test).

R (30) Before next flight operationally test thrust reverser
R system (Ref. 71-00-00).

R C. Install Translating Cowl Screwjack Connected to R.H. Centre
R (No.2) Gearbox

R (1) Equipment required:

R Clean, stiff-bristled brush
R 1702141)Tang wrench
R (AiResearch No.287532-1-1))
R 1702148) Screwdriver, special
R (AiResearch No.287925-1))

R (2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Degreasing fluid (Inhibited and stabilized 1.1.1. trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21
Jointing compound	DTD.900/ 4586 (Hylomar light)	-	426A

R (3) Ensure thrust reverser is locked and systems are
R deactivated and tagged as detailed in operation
R 1.C.(3).

R (4) Remove blanks from connectors and apertures.

R (5) WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE
R VENTILATION AND AVOID SKIN CONTACT AND
R INHALING THE VAPOUR.
R On engines without S.B.78-3875, cold liquid degrease
R mating faces of upper L.H. and R.H. detachable firewall
R assemblies, pressure cylinder and firewall assembly,
R firewall extensions (No.2 engine only), inner firewall,
R translating cowl and upper R.H. panel assembly and
R allow to dry.

R On engines with S.B.78-3875, cold liquid degrease
R mating faces of upper R.H. detachable firewall assembly,
R upper R.H. pressure cylinder, R.H. firewall extension
R (No.2 engine only), inner firewall, translating cowl
R and upper R.H. panel assembly and allow to dry.

R (6) On engines without S.B.78-3875, brush apply a thin film
R of jointing compound to mating faces of upper L.H. and
R R.H. detachable firewall assemblies, pressure cylinder
R and firewall assembly, firewall extensions (No.2 engine
R only), inner firewall, translating cowl and upper R.H.
R panel assembly. Allow compound to dry for a minimum
R period of 10 minutes.

R (7) On engines with S.B.78-3875, brush apply a thin film
R of jointing compound to mating faces of upper R.H.
R detachable firewall assembly, upper R.H. pressure
R cylinder, R.H. firewall extension (No.2 engine only),
R inner firewall, translating cowl and upper R.H. panel
R assembly. Allow compound to dry for a minimum period
R of 10 minutes.

R (8) CAUTION: REFER TO FIG.203, RETAIN SCREWJACK (8) IN THE HORIZONTAL POSITION. DO NOT ALLOW THE WEIGHT OF THE SCREWJACK TO BE SUSPENDED ON THE REAR BEARING.
Insert screwjack (8)(non threaded end leading) into thrust reverser case mounting beam. Locate screwjack in rear bearing housing (1) and push fully home.

R (9) Refer to fig.202 detail B, slide lockwasher (3) over screwjack (7) threaded end and locate in screwjack recess for security.

R (10) Locate gearbox (6) in mounting bracket on thrust reverser case with nameplate facing outwards from engine.

R (11) Engage gearbox (6) master spline with screwjack (7) master spline then push gearbox fully home. Screw retaining nut (4) onto screwjack threads and tighten sufficiently to eliminate independent endfloat of the screwjack. Do not torque tighten retaining nut at this stage.

R (12) On engines without S.B.78-3852, fit and secure bolts and washers (5).

R (13) On engines with S.B.78-3852, fit and secure two shorter bolts and washers (5) through gearbox upper mounting bracket and two longer bolts and washers (10) through gearbox lower mounting bracket.

R (14) Refer to fig.203, depress slider plate (9) and using feeler gauges, check that clearance A between slider plate and mounting beam trackway is within the limits 0.004 to 0.047in. (0,102 to 0,194 mm.).

R On engines without AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), turn screwjack (8) by hand to reposition mechanical drive housing (7) and check at a further two positions along trackway that clearance A is within the limits stated.

R On engines with AiResearch S.B.121190-78-1284 (R.R.
R S.B.78-4892), using spannering flats, turn screwjack
R (8) to reposition mechanical drive housing (7) and
R check at a further two positions along trackway that
R clearance A is within the limits stated.

R If clearance A is not within the limits stated,
R proceed as follows:

R (a) Refer to fig.202 detail B, on engines without
R S.B.78-3852, remove bolts and washers (5) and
R remove gearbox (6) together with screwjack (7).

R (b) On engines with S.B.78-3852, remove bolts and
R washers (5) and bolts and washers (10) then
R remove gearbox (6) together with screwjack (7).

R (c) Refer to fig.203, disengage slider plate (9)
R spring clips from mechanical drive housing (7)
R then remove slider plate, slider plate bearing
R liner (10), shim(s)(11) and compression plate
R (12).

R (d) Calculate and select (to a maximum of two shims)
R thickness of shim(s)(11) necessary to bring
R clearance A within the limits stated.

R (e) Fit compression plate (12) into mechanical drive
R housing (7) recess followed by selected shim(s)
R (11), slider plate bearing liner (10) (chamfered
R end leading) and slider plate (9). Engage
R slider plate spring clips with mechanical drive
R housing.

R (f) Refer to fig.202 detail B, insert screwjack (7)
R together with gearbox (6)(screwjack leading)
R into thrust reverser case mounting beam.
R Locate screwjack in rear bearing housing and
R (ensuring nameplate faces outward from engine)
R gearbox in mounting bracket on thrust reverser
R case. Push screwjack and gearbox fully home.

R (g) On engines without S.B.78-3852, fit and secure
R bolts and washers (5).

R (h) On engines with S.B.78-3852, fit and secure two
R shorter bolts and washers (5) through gearbox
R upper mounting bracket and two longer bolts and
R washers (10) through gearbox lower mounting
R bracket.

R (j) Refer to fig.203, re-check clearance A at three
R positions.

R (15) CAUTION: REFER TO FIG.202 DETAIL B, ON ENGINES WITHOUT
R AIRESEARCH S.B.121190-78-1284 (R.R. S.B.78-
R 4892), DO NOT USE WATER PUMP PLIERS OR SIMILAR
R METAL GRIPS TO RESTRAIN SCREWJACK (7) WHEN
R TORQUE TIGHTENING RETAINING NUT (4).
R On engines with AiResearch S.B.121190-78-1284 (R.R.
R S.B.78-4892), use screwjack (7) spannering flats to
R restrain screwjack when torque tightening retaining
R nut (4).

R Using tang wrench, torque tighten retaining nut (4) to
R 80-100 lbs.ins. (9.04-11.31 Nm.).

R (16) CAUTION: IN ORDER TO PREVENT SEVERE DAMAGE TO THE
R GEARBOX (6) AND SCREWJACK (7) SPLINES, IT
R IS ESSENTIAL THAT THERE IS FULL ENGAGEMENT
R OF THE SPLINES WITH NO INDEPENDENT ENDFLOAT
R OF THE SCREWJACK.
R Check screwjack (7) for endfloat. If endfloat
R exists, fully unscrew retaining nut (4), ensure full
R engagement of gearbox (6) and screwjack splines,
R screw retaining nut onto screwjack threads and torque
R tighten then check screwjack for endfloat.

R (17) Slide lockwasher (3) forward to abut retaining nut
R (4) and using special screwdriver, engage lockwasher
R tabs with retaining nut slots.

R (18) Refer to fig.203, on engines without AiResearch
R S.B.121190-78-1284 (R.R. S.B.78-4892), turn screwjack
R (8) by hand until mechanical drive housing (7) bolt
R holes align with translating cowl ring assembly bolt
R holes.

R (19) On engines with AiResearch S.B.121190-78-1284 (R.R.
R S.B.78-4892), using spannering flats, turn screwjack
R (8) until mechanical drive housing (7) bolt holes
R align with translating cowl ring assembly bolt holes.

R (20) Measure and record the distance between mechanical
R drive housing (7) rear face and rear bearing housing
R (1) forward face then measure the distance between
R same two points on remaining five screwjacks.

R The recorded distance must be within 0.0625 in.
R (1,59 mm.) of the measurement obtained from remaining
R five screwjacks.

R If the recorded distance is not within the limit
R stated, adjust as follows:

R (a) On engines without AiResearch S.B.121190-78-1284
R (R.R. S.B.78-4892), turn screwjack (8) by hand
R until the distance between mechanical drive
R housing (7) rear face and rear bearing housing
R (1) forward face is within the limit stated of
R the measurement obtained from remaining five
R screwjacks.

R (b) On engines with AiResearch S.B.121190-78-1284
R (R.R. S.B.78-4892), using spannering flats, turn
R screwjack (8) until the distance between mechanical
R drive housing (7) rear face and rear bearing
R housing (1) forward face is within the limit
R stated of the measurement obtained from remaining
R five screwjacks.

R NOTE: One turn of screwjack moves mechanical
R drive housing by approximately 0.2in.
R (5,08 mm.).

R (21) On engines without S.B.78-3275, position packing block
R (5) and plate (6) then fit and secure bolts and washers
R (3) and screws (2).

R (22) On engines with S.B.78-3275, fit and secure bolts and
R washers (3) and screws (2).

R NOTE: On engines with S.B.78-3275, packing block
R (5) and plate (6) are fitted to the translating
R cowl ring assemblies.

R (23) Refer to fig.201, fit upper R.H. panel assembly (4)
R and secure fasteners (3).

R (24) Refer to fig.202 detail B, connect flexible drive
R connectors (1) and (2) and using tang wrench, torque
R tighten to 40-50 lbs.ins. (4.52-5.65 Nm.).

R (25) Connect lock yoke (8) to control rod housing (9).

R (26) On engines without S.B.78-3875, install firewall and
R pressure cylinder assembly (Ref. 71-30-01).

R (27) On engines with S.B.78-3875, install upper R.H.
R pressure cylinder and upper R.H. detachable firewall
R assembly (Ref. 71-30-01).

R (28) No.1 and No.3 engines

R (a) Fit L.H. and R.H. hinged cowls, 413A or 423A
R (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (29) No.2 engine

R (a) Fit L.H. and R.H. upper hinged cowls, 433DL and
R 434DR (Ref. 71-12-05).

R (b) Fit L.H. and R.H. lower hinged cowls, 433AL and
R 434AR (Ref. 71-12-01).

R (c) Fit L.H. and R.H. mid fixed cowls, 433CL and
R 434CR (Ref. 71-12-03).

R (30) Unlock and reactivate thrust reverser and associated
R systems (Ref. 78-30-00, Servicing).

R (31) Operate thrust reverser to forward thrust position
R (Ref. 78-30-00, Adjustment/Test).

R (32) Before next flight operationally test thrust reverser
R system (Ref. 71-00-00).

R D. Install Translating Cowl Screwjack Connected to L.H. Centre
R (No.5) Gearbox

R (1) Equipment required:

R Clean, stiff-bristled brush
R 1702141) Tang wrench
R (AiResearch No.287532-1-1))
R 1702148) Screwdriver, special
R (AiResearch No.287925-1))

R (2) Material required:

	British Spec./Ref.	American Spec./Ref.	Omat Item No.
Degreasing fluid (Inhibited and stabilized 1.1.1. trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21
Jointing compound	DTD.900/ 4586 (Hylomar light)	-	426A

R (3) Ensure thrust reverser is locked and systems are
R deactivated and tagged as detailed in operation
R 1.D.(3).

R (4) Remove blanks from connectors and apertures.

R (5) WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE VENTILATION AND AVOID SKIN CONTACT AND INHALING THE VAPOUR.
On engines without S.B.78-3875, cold liquid degrease mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly and allow to dry.

R On engines with S.B.78-3875, cold liquid degrease mating faces of upper L.H. detachable firewall assembly, upper L.H. pressure cylinder, L.H. firewall extension (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly and allow to dry.

R (6) On engines without S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

R (7) On engines with S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. detachable firewall assembly, upper L.H. pressure cylinder, L.H. firewall extension (No.2 engine only), inner firewall, translating cowl and upper L.H. panel assembly. Allow compound to dry for a minimum period of 10 minutes.

R (8) CAUTION: REFER TO FIG.203, RETAIN SCREWJACK (8) IN THE HORIZONTAL POSITION. DO NOT ALLOW THE WEIGHT OF THE SCREWJACK TO BE SUSPENDED ON THE REAR BEARING.
Insert screwjack (8)(non threaded end leading) into thrust reverser case mounting beam. Locate screwjack in rear bearing housing (1) and push fully home.

R (9) Refer to fig.202 detail C, slide lockwasher (3) over screwjack (7) threaded end and locate in screwjack recess for security.

R (10) Locate gearbox (6) in mounting bracket on thrust
R reverser case with nameplate facing outwards from
R engine.

R (11) Engage gearbox (6) master spline with screwjack (7)
R master spline then push gearbox fully home. Screw
R retaining nut (4) onto screwjack threads and tighten
R sufficiently to eliminate independent endfloat of
R the screwjack. Do not torque tighten retaining nut
R at this stage.

R (12) On engines without S.B.78-3852, fit and secure bolts
R and washers (5).

R (13) On engines with S.B.78-3852, fit and secure two shorter
R bolts and washers (5) through gearbox upper mounting
R bracket and two longer bolts and washers (10) through
R gearbox lower mounting bracket.

R (14) Refer to fig.203, depress slider plate (9) and using
R feeler gauges, check that clearance A between slider
R plate and mounting beam trackway is within the limits
R 0.004 to 0.047in. (0,102 to 0,194 mm.).

R On engines without AiResearch S.B.121190-78-1284
R (R.R. S.B.78-4892), turn screwjack (8) by hand to
R reposition mechanical drive housing (7) and check at
R a further two positions along trackway that clearance
R A is within the limits stated.

R On engines with AiResearch S.B.121190-78-1284 (R.R.
R S.B.78-4892), using spannering flats, turn screwjack
R (8) to reposition mechanical drive housing (7) and
R check at a further two positions along trackway that
R clearance A is within the limits stated.

R If clearance A is not within the limits stated,
R proceed as follows:

R (a) Refer to fig.202 detail C, on engines without
R S.B.78-3852, remove bolts and washers (5) and
R remove gearbox (6) together with screwjack (7).

R (b) On engines with S.B.78-3852, remove bolts and
R washers (5) and bolts and washers (10) then remove
R gearbox (6) together with screwjack (7).

R (c) Refer to fig.203, disengage slider plate (9)
R spring clips from mechanical drive housing (7)
R then remove slider plate, slider plate bearing
R liner (10), shim(s)(11) and compression plate (12).

R (d) Calculate and select (to a maximum of two shims)
R thickness of shim(s)(11) necessary to bring
R clearance A within the limits stated.

R (e) Fit compression plate (12) into mechanical drive
R housing (7) recess followed by selected shim(s)
R (11), slider plate bearing liner (10) (chamfered
R end leading) and slider plate (9). Engage
R slider plate spring clips with mechanical drive
R housing.

R (f) Refer to fig.202 detail C, insert screwjack (7)
R together with gearbox (6) (screwjack leading)
R into thrust reverser case mounting beam. Locate
R screwjack in rear bearing housing and (ensuring
R nameplate faces outward from engine) gearbox
R in mounting bracket on thrust reverser case.
R Push screwjack and gearbox fully home.

R (g) On engines without S.B.78-3852, fit and secure
R bolts and washers (5).

R (h) On engines with S.B.78-3852, fit and secure two
R shorter bolts and washers (5) through gearbox
R upper mounting bracket and two longer bolts and
R washers (10) through gearbox lower mounting
R bracket.

R (j) Refer to fig.203, re-check clearance A at three
R positions.

R (15) CAUTION: REFER TO FIG.202 DETAIL C, ON ENGINES WITHOUT
R AIRESEARCH S.B.121190-78-1284 (R.R. S.B.78-
R 4892), DO NOT USE WATER PUMP PLIERS OR
R SIMILAR METAL GRIPS TO RESTRAIN SCREWJACK
R (7) WHEN TORQUE TIGHTENING RETAINING NUT (4).
R On engines with AiResearch S.B.121190-78-1284 (R.R.
R S.B.78-4892), use screwjack (7) spannering flats to
R restrain screwjack when torque tightening retaining
R nut (4).

R Using tang wrench, torque tighten retaining nut (4)
R to 80-100 lbs.ins. (9.04-11.31 Nm.).

R (16) CAUTION: IN ORDER TO PREVENT SEVERE DAMAGE TO THE
R GEARBOX (6) AND SCREWJACK (7) SPLINES, IT
R IS ESSENTIAL THAT THERE IS NO INDEPENDENT
R ENDFLOAT OF THE SCREWJACK.
R Check screwjack (7) for endfloat. If endfloat
R exists, fully unscrew retaining nut (4), ensure full
R engagement of gearbox (6) and screwjack splines,
R screw retaining nut onto screwjack threads and
R torque tighten then check screwjack for endfloat.

R (17) Slide lockwasher (3) forward to abut retaining nut
R (4) and using special screwdriver, engage lockwasher
R tabs with retaining nut slots.

R (18) Refer to fig.203, on engines without AiResearch S.B.
R 121190-78-1284 (R.R. S.B.78-4982), turn screwjack (8)
R by hand until mechanical drive housing (7) bolt holes
R align with translating cowl ring assembly bolt holes.

R (19) On engines with AiResearch S.B.121190-78-1284 (R.R.
R S.B.78-4892), using spannering flats, turn screwjack
R (8) until mechanical drive housing (7) bolt holes
R align with translating cowl ring assembly bolt holes.

R (20) Measure and record the distance between mechanical
R drive housing (7) rear face and rear bearing housing
R (1) forward face then measure the distance between
R same two points on remaining five screwjacks.

R The recorded distance must be within 0.0625in.
R (1,59 mm.) of the measurement obtained from remaining
R five screwjacks.

R If the recorded distance is not within the limit
R stated, adjust as follows:

R (a) On engines without AiResearch S.B.121190-78-1284
R (R.R. S.B.78-4892), turn screwjack (8) by hand
R until the distance between mechanical drive
R housing (7) rear face and rear bearing housing
R (1) forward face is within the limit stated of
R the measurement obtained from remaining five
R screwjacks.

R (b) On engines with AiResearch S.B.121190-78-1284
R (R.R. S.B.78-4892), using spannering flats, turn
R screwjack (8) until the distance between mechanical
R drive housing (7) rear face and rear bearing
R housing (1) forward face is within the limit
R stated of the measurement obtained from remaining
R five screwjacks.

R NOTE: One turn of screwjack moves mechanical
R drive housing by approximately 0.2in.
R (5,08 mm.).

R (21) On engines without S.B.78-3275, position packing
R block (5) and plate (6) then fit and secure bolts
R and washers (3) and screws (2).

R (22) On engines with S.B.78-3275, fit and secure bolts
R and washers (3) and screws (2).

R NOTE: On engines with S.B.78-3275, packing block
R (5) and plate (6) are fitted to the
R translating cowl ring assemblies.

R (23) Refer to fig.201, fit upper L.H. panel assembly (2)
R and secure fasteners (1).

R (24) Refer to fig.202 detail C, connect flexible drive
R connectors (1) and (2) and using tang wrench, torque
R tighten to 40-50 lbs.ins. (4.52-5.65 Nm.).

R (25) Connect lock yoke (8) to control rod housing (9).

R (26) On engines without S.B.78-3875, install firewall and
R pressure cylinder assembly (Ref. 71-30-01).

R (27) On engines with S.B.78-3875, install upper L.H.
R pressure cylinder and upper L.H. detachable firewall
R assembly (Ref. 71-30-01).

R (28) No.1 and No.3 engines

R (a) Fit L.H. and R.H. hinged cowls, 413A or 423A
R (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (29) No.2 engine

R (a) Fit L.H. and R.H. upper hinged cowls, 433DL and
R 434DR (Ref. 71-12-05).

R (b) Fit L.H. and R.H. lower hinged cowls, 433AL and
R 434AR (Ref. 71-12-01).

R (c) Fit L.H. and R.H. mid fixed cowls, 433CL and
R 434CR (Ref. 71-12-01).

R (30) Unlock and reactivate thrust reverser and associated
R systems (Ref. 78-30-00, Servicing).

R (31) Operate thrust reverser to forward thrust position
R (Ref. 78-30-00, Adjustment/Test).

R (32) Before next flight operationally test thrust reverser
R system (Ref. 71-00-00).

R E. Install Translating Cowl Screwjack Connected to Lower R.H.
R (No.3) or L.H. (No.4) Gearbox

R (1) Equipment required:

R Clean, stiff-bristled brush
R 1702141)Tang wrench
R (AiResearch No.287532-1-1))
R 1702148) Screwdriver, special
R (AiResearch No.287925-1))

(2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Degreasing fluid (Inhibited and stabilized 1.1.1. trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21
Jointing compound	DTD.900/ 4586 (Hylomar light)	-	426A

(3) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation 1.E.(3).

(4) Remove blanks from connectors and apertures.

(5) WARNING: WHEN USING DEGREASING FLUID, ENSURE ADEQUATE VENTILATION AND AVOID SKIN CONTACT AND INHALING THE VAPOUR.

On engines without S.B.78-3875, cold liquid degrease mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and lower panel assembly and allow to dry.

On engines with S.B.78-3875, cold liquid degrease mating faces of upper L.H. and R.H. detachable firewall assemblies, lower fixed firewall and pressure cylinder assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and lower panel assembly and allow to dry.

(6) On engines without S.B.78-3875, brush apply a thin film of jointing compound to mating faces of upper L.H. and R.H. detachable firewall assemblies, pressure cylinder and firewall assembly, firewall extensions (No.2 engine only), inner firewall, translating cowl and lower panel assembly. Allow compound to dry for a minimum period of 10 minutes.

R (7) On engines with S.B.78-3875, brush apply a thin film
R of jointing compound to mating faces of upper L.H. and
R R.H. detachable firewall assemblies, lower fixed
R firewall and pressure cylinder assembly, firewall
R extensions (No.2 engine only), inner firewall,
R translating cowl and lower panel assembly. Allow
R compound to dry for a minimum period of 10 minutes.

R (8) CAUTION: REFER TO FIG.203, RETAIN SCREWJACK (8) IN
R THE HORIZONTAL POSITION. DO NOT ALLOW THE
R WEIGHT OF THE SCREWJACK TO BE SUSPENDED ON
R THE REAR BEARING.
R Insert screwjack (8) (non threaded end leading) into
R thrust reverser case mounting beam. Locate screwjack
R in rear bearing housing (1) and push fully home.

R (9) Refer to fig.201, slide lockwasher (9) over screwjack
R (11) threaded end and locate in screwjack recess for
R security.

R (10) Locate gearbox (13) in mounting bracket on thrust
R reverser case with nameplate facing outwards from
R engine.

R (11) Engage gearbox (13) master spline with screwjack (11)
R master spline then push gearbox fully home. Screw
R retaining nut (10) onto screwjack threads and tighten
R sufficiently to eliminate independent endfloat of
R the screwjack. Do not torque tighten retaining nut
R at this stage.

R (12) Fit and secure bolts and washers (12).

R (13) Refer to fig.203, depress slider plate (9) and using
R feeler gauges, check that clearance A between slider
R plate and mounting beam trackway is within the limits
R 0.004 to 0.047in. (0.102 to 0.194 mm.).

R On engines without AiResearch S.B.121190-78-1284
R (R.R. S.B.78-4892), turn screwjack (8) by hand to
R reposition mechanical drive housing (7) and check at
R a further two positions along trackway that clearance
R A is within the limits stated.

R On engines with AiResearch S.B.121190-78-1284 (R.R.
R S.B.78-4892), using spannering flats, turn screwjack
R (8) to reposition mechanical drive housing (7) and
R check at a further two positions along trackway that
R clearance A is within the limits stated.

R If clearance A is not within the limits stated,
R proceed as follows:

R (a) Refer to fig.201, remove bolts and washers (12)
R and remove gearbox (13) together with screwjack
R (11).

R (b) Refer to fig.203, disengage slider plate (9)
R spring clips from mechanical drive housing (7)
R then remove slider plate, slider plate bearing
R liner (10), shim(s)(11) and compression plate
R (12).

R (c) Calculate and select (to a maximum of two shims)
R thickness of shim(s)(11) necessary to bring
R clearance A within the limits stated.

R (d) Fit compression plate (12) into mechanical drive
R housing (7) recess followed by selected shim(s)
R (11), slider plate bearing liner (10) (chamfered
R end leading) and slider plate (9). Engage
R slider plate spring clips with mechanical drive
R housing.

R (e) Refer to fig.201, insert screwjack (11) together
R with gearbox (13) (screwjack leading) into
R thrust reverser case mounting beam. Locate
R screwjack in rear bearing housing and (ensuring
R nameplate faces outwards from engine) gearbox
R in mounting bracket on thrust reverser case.
R Push screwjack and gearbox fully home.

R (f) Fit and secure bolts and washers (12).

R (g) Refer to fig.203, re-check clearance A at
R three positions.

R (14) CAUTION: REFER TO FIG.201, ON ENGINES WITHOUT AIRESEARCH S.B.121190-78-1284 (R.R. S.B.78-4892), DO NOT USE WATER PUMP PLIERS OR SIMILAR METAL GRIPS TO RESTRAIN SCREWJACK (11) WHEN TORQUE TIGHTENING RETAINING NUT (10).

On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), use screwjack (11) spannering flats to restrain screwjack when torque tightening retaining nut (10).

Using tang wrench, torque tighten retaining nut (10) to 80-100 lbs.ins. (9.04-11.31 Nm.).

(15) CAUTION: IN ORDER TO PREVENT SEVERE DAMAGE TO THE GEARBOX (13) AND SCREWJACK (11) SPLINES, IT IS ESSENTIAL THAT THERE IS FULL ENGAGEMENT OF THE SPLINES WITH NO INDEPENDENT ENDFLOAT OF THE SCREWJACK.

Check screwjack (11) for endfloat. If endfloat exists, fully unscrew retaining nut (10), ensure full engagement of gearbox (13) and screwjack splines, screw retaining nut onto screwjack threads and torque tighten then check screwjack for endfloat.

(16) Slide lockwasher (9) forward to abut retaining nut (10) and using special screwdriver, engage lockwasher tabs with retaining nut slots.

(17) Refer to fig.203, on engines without AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), turn screwjack (8) by hand until mechanical drive housing (7) bolt holes align with translating cowl ring assembly bolt holes.

(18) On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), using spannering flats, turn screwjack (8) until mechanical drive housing (7) bolt holes align with translating cowl ring assembly bolt holes.

R (19) Measure and record the distance between mechanical drive housing (7) rear face and rear bearing housing (1) forward face then measure the distance between same two points on remaining five screwjacks.

R The recorded distance must be within 0.0625 in. (1,59 mm.) of the measurement obtained from remaining five screwjacks.

R If the recorded distance is not within the limit stated, adjust as follows:

R (a) On engines without AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), turn screwjack (8) by hand until the distance between mechanical drive housing (7) rear face and rear bearing housing (1) forward face is within the limit stated of the measurement obtained from remaining five screwjacks.

R (b) On engines with AiResearch S.B.121190-78-1284 (R.R. S.B.78-4892), using spannering flats, turn screwjack (8) until the distance between mechanical drive housing (7) rear face and rear bearing housing (1) forward face is within the limit stated of the measurement obtained from remaining five screwjacks.

R NOTE: One turn of screwjack moves mechanical drive housing by approximately 0.2in. (5,08 mm.).

R (20) On engines without S.B.78-3275, position packing block (5) and plate (6) then fit and secure bolts and washers (3) and screws (2).

R (21) On engines with S.B.78-3275, fit and secure bolts and washers (3) and screws (2).

R NOTE: On engines with S.B.78-3275, packing block (5) and plate (6) are fitted to the translating cowl ring assemblies.

R (22) Refer to fig.201, fit lower panel assembly (6) and
R secure fasteners (5).

R (23) Connect flexible drive connectors (7) and (8) and
R using tang wrench, torque tighten to 40-50 lbs.ins.
R (4.52-5.65 Nm.).

R (24) On engines without S.B.78-3875, install firewall
R and pressure cylinder assembly (Ref. 71-30-01).

R (25) On engines with S.B.78-3875, install lower fixed
R firewall and pressure cylinder assembly (Ref. 71-30-01).

R (26) No.1 and No.3 engine

R (a) Fit L.H. and R.H. hinged cowls, 413A or 423A
R (Ref. 71-11-01) and 414A or 424A (Ref. 71-11-02).

R (27) No.2 engine

R (a) Fit L.H. and R.H. upper hinged cowls, 433DL and
R 434DR (Ref. 71-12-05).

R (b) Fit L.H. and R.H. lower hinged cowls, 433AL and
R 434AR (Ref. 71-12-01).

R (c) Fit L.H. and R.H. mid fixed cowls, 433CL and
R 434CR (Ref. 71-12-03).

R (28) Unlock and reactivate thrust reverser and associated
R systems (Ref. 78-30-00, Servicing).

R (29) Operate thrust reverser to forward thrust position
R (Ref. 78-30-00, Adjustment/Test).

R (30) Before next flight operationally test thrust reverser
R system (Ref. 71-00-00).

R 3. Inspection/Check Translating Cowl Screwjacks

Service Bulletin referred to:

S.B.78-3494 - Translating Cowl Mechanical Drive Housing Assembly with Bolted Retaining Collar.

A. Inspect Translating Cowl Screwjacks

(1) Operate thrust reverser to reverse thrust position (Ref. 78-30-00, Adjustment/Test).

(2) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref. 78-30-00, Servicing).

(3) Inspect translating cowl screwjacks for deformation.
R For acceptance standards see 3.B.

R (4) On engines without S.B.78-3494, inspect mechanical drive housing for cracks around rivets and sheared or loosened rivets.

(5) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

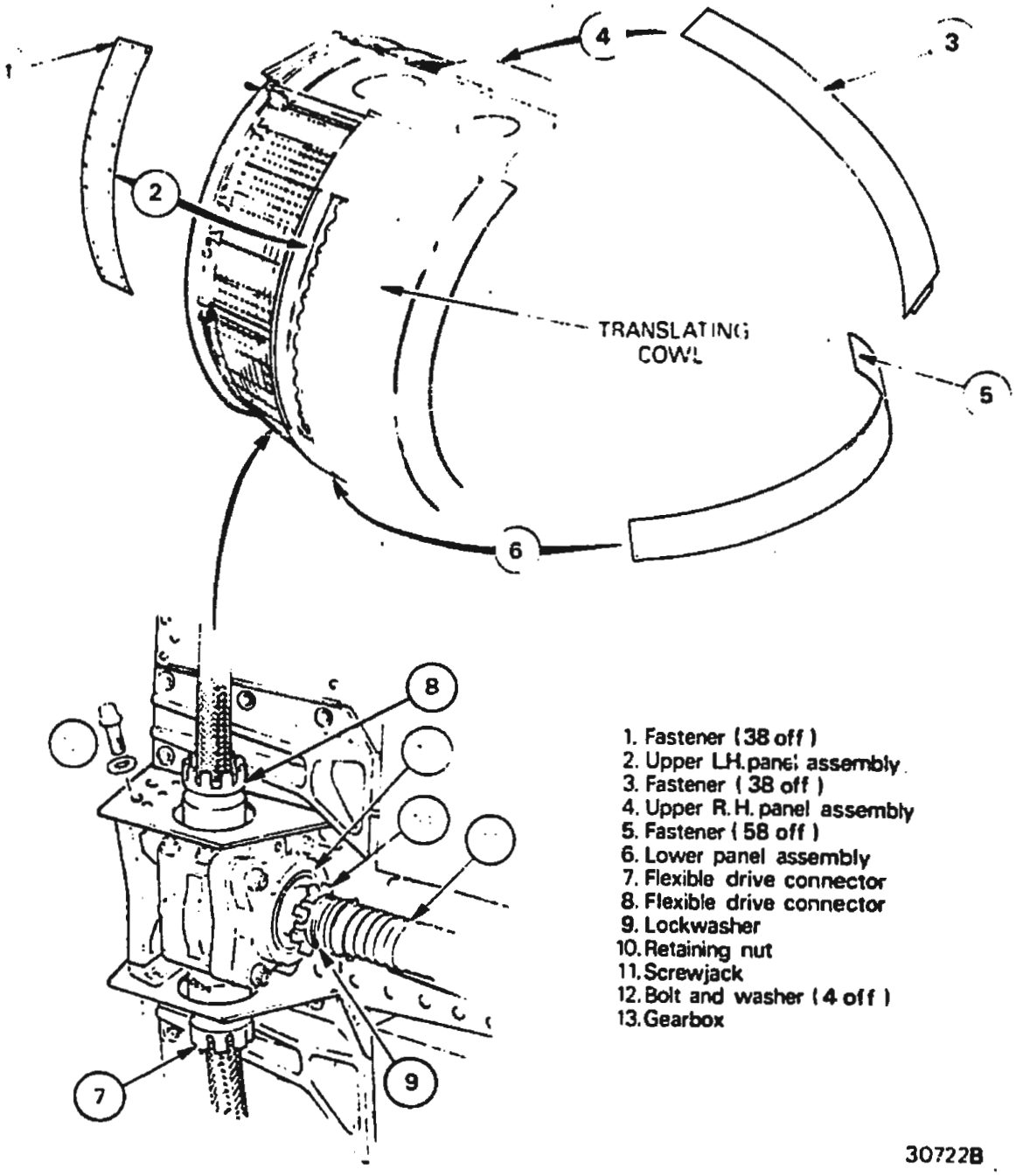
(6) Operate thrust reverser to forward thrust position (Ref. 78-30-00, Adjustment/Test).

B. Acceptance Standards

Cracks in bearing housing, loosened or sheared rivets are not acceptable.

Damage within the following limitations is acceptable.

(1) Deformation must not exceed 0.015in. (0,381 mm.) per foot run of screwjack.



1. Fastener (38 off)
2. Upper LH. panel assembly
3. Fastener (38 off)
4. Upper R.H. panel assembly
5. Fastener (58 off)
6. Lower panel assembly
7. Flexible drive connector
8. Flexible drive connector
9. Lockwasher
10. Retaining nut
11. Screwjack
12. Bolt and washer (4 off)
13. Gearbox

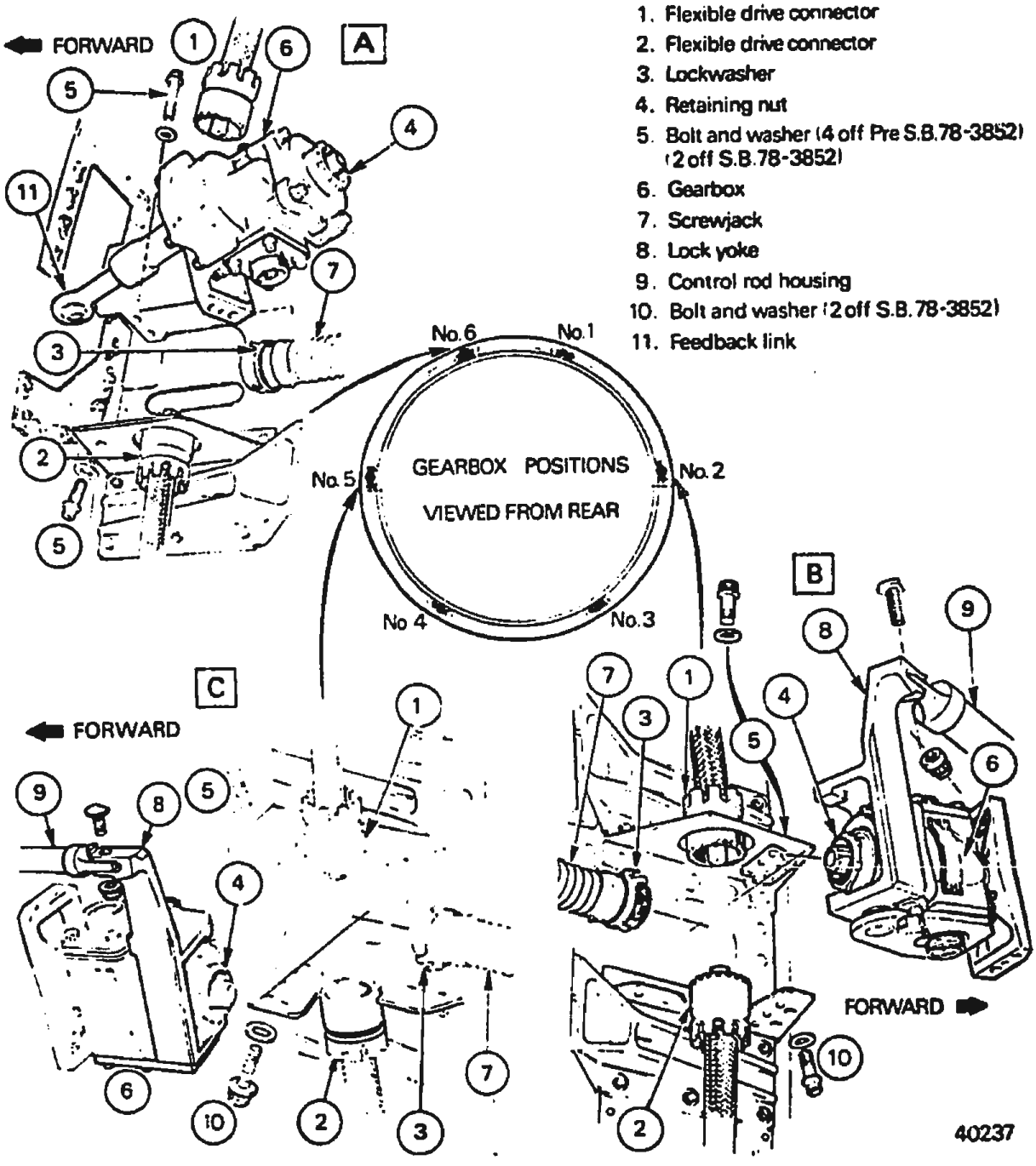
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R R R Upper R.H. and lower L.H. and R.H. translating cowl screwjack - Removal/Installation Fig.201

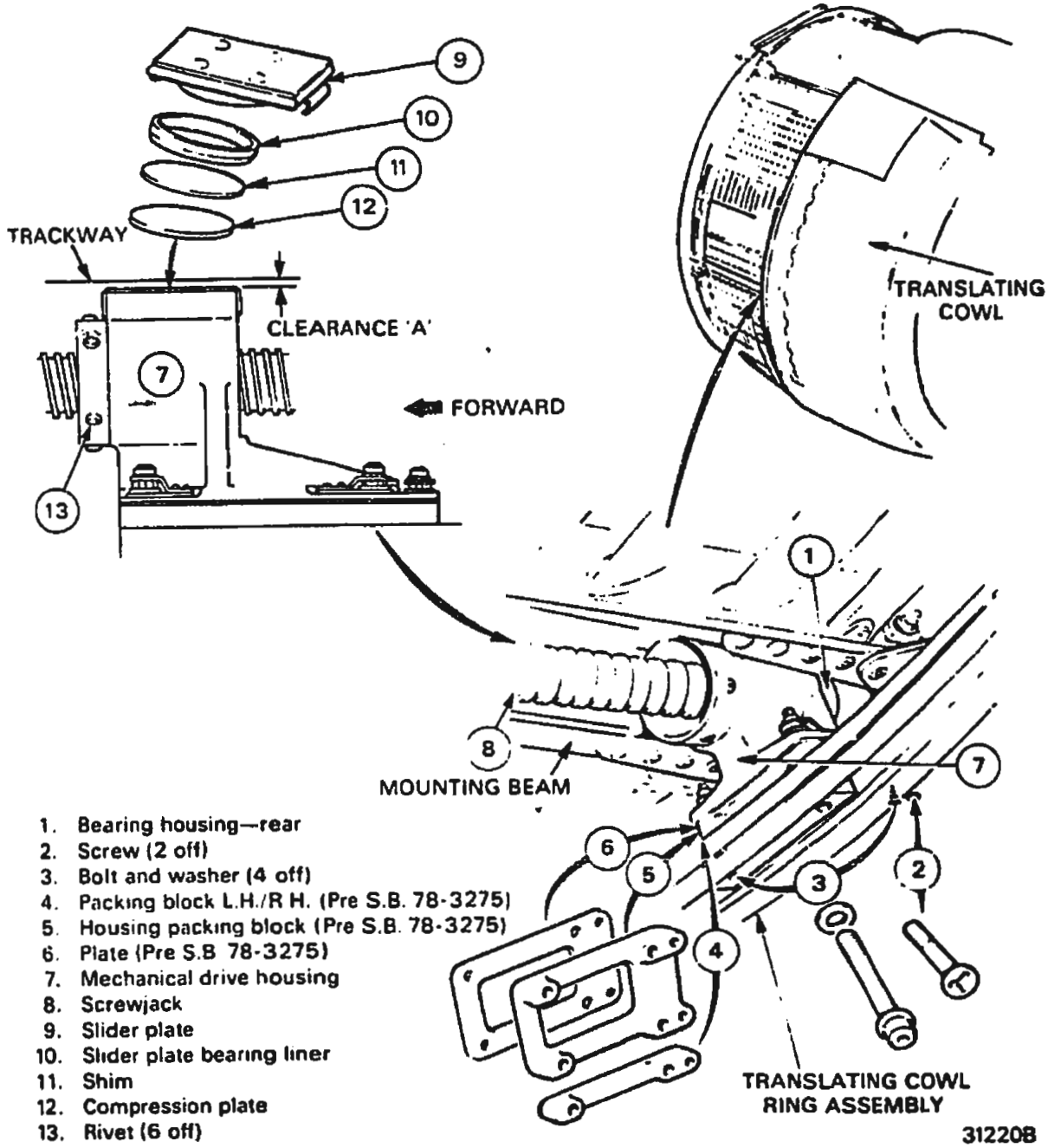
R R EFFECTIVITY: ALL

050B

1A



R Upper L.H. and centre L.H. and R.H. translating cowl
R screwjack - Removal/Installation S.B.78-3852
R Fig.202



1. Bearing housing—rear
2. Screw (2 off)
3. Bolt and washer (4 off)
4. Packing block L.H./R H. (Pre S.B. 78-3275)
5. Housing packing block (Pre S.B. 78-3275)
6. Plate (Pre S.B 78-3275)
7. Mechanical drive housing
8. Screwjack
9. Slider plate
10. Slider plate bearing liner
11. Shim
12. Compression plate
13. Rivet (6 off)

R R Translating cowl screwjack - Removal/Installation Fig.203

R R EFFECTIVITY: ALL

DEFLECTOR VANE (CASCADE) - MAINTENANCE PRACTICES

1. General

In the event of a thrust reverser system failure that prevents thrust reverser operation to reverse thrust position or the translating cowl being manually cycled rearwards, carry out manual traversing procedure (Ref.78-31-07).

Service Bulletins referred to:

78-2160	Fabricated Cascade Boxes Replaced by Cast Cascade Boxes
78-3224	Deflector Vanes (Cascade) - Narrow 20 Deg. Side Turning Cascade Boxes - Forward Attachment Strenghtened
78-3607	Deflector Vanes (Cascade) - Wide Deflector Boxes - Thicker Nose Fairing End Support Brackets
78-5011	Deflector Vanes (Cascade) - Nose Fairing Assembly Attachment Brackets and Support Plates in 0.9 mm. (0.36in.) Gauge Material
78-5893	Exhaust - Thrust Reverser - Vanes, Deflector (cascade) No.10 and 11 Position Nose Fairing Intermediate Flange Re-profiled edge.

Referenced Procedures.

72-03-00	Gas Generator Fairings - Removal/Installation
78-30-00	Thrust Reverser - Servicing and Adjustment/Test
78-31-07	Translating Cowl - Maintenance Practices

Illustrated Parts Catalogue References.

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

78-31-20	Thrust Reverser, Deflector Vanes Installation

2. Servicing Swivelling Flap Hinges and Spring Mechansim

A. Lubricate Swivelling Flap Hinges and Spring Mechanism

(1) Material required

		British Spec./Ref.	American Spec./Ref.	OMat Item No.
R R R	Anti-corrosive inhibiting fluid	Ardrox 3961 (PX24) DEF Stan 68-10/2	-	1042A

(2) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit reverser locks (Ref.78-30-00).

(3) Manually operate swivelling flaps into the open position.

(4) Refer to fig.201, lubricate hinges and spring mechanism with anti-corrosion inhibiting fluid at points 1 and 2.

(5) Wipe away any surplus lubricant.

(6) Manually operate swivelling flaps and check for freedom of movement.

(7) Unlock and reactivate thrust reverser and associated systems (Ref.78-30-00, Servicing).

3. Removal/Installation Deflector Vane (cascade) (Zone 415, 425, 435)

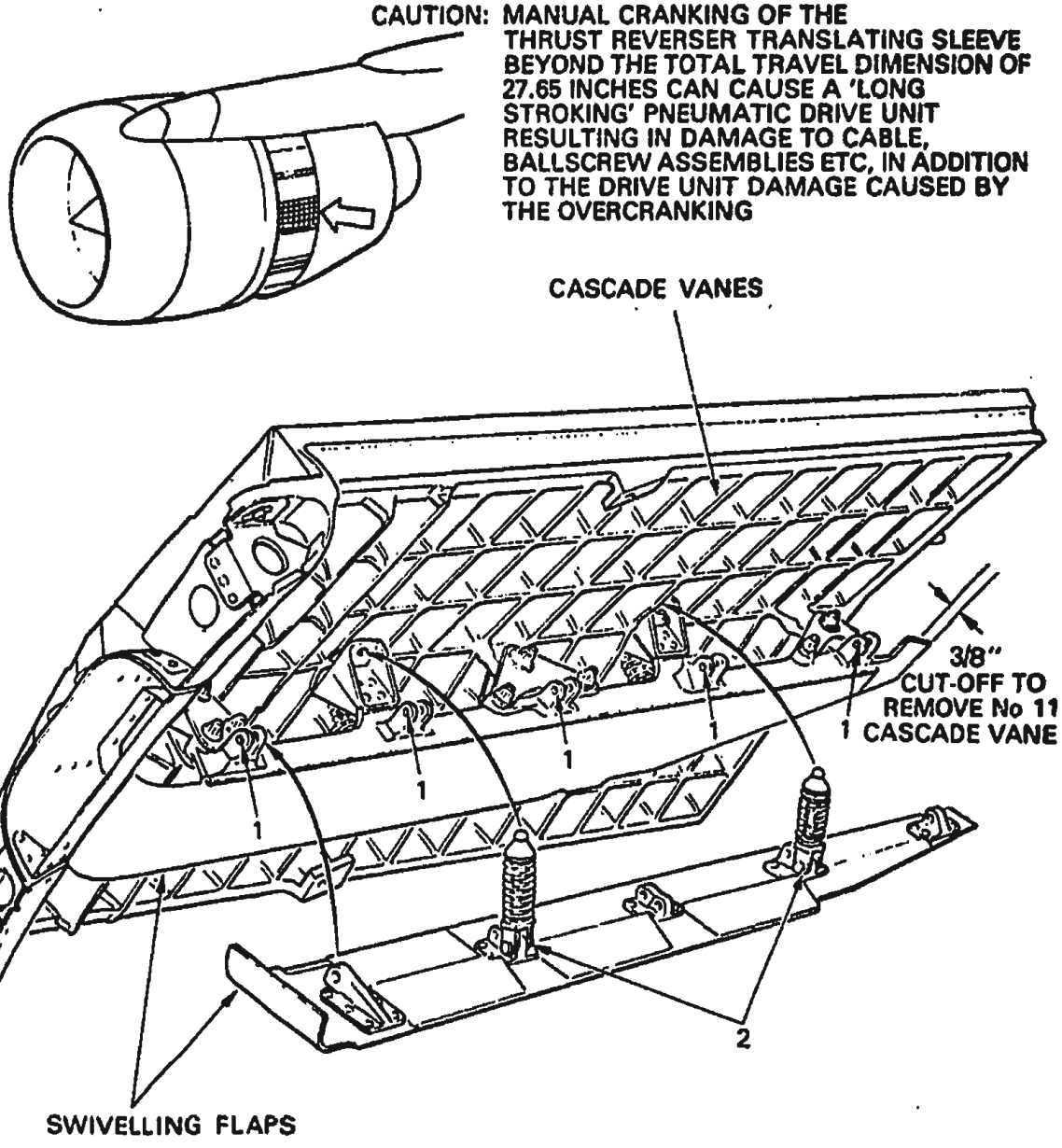
The deflector vanes comprises 10 wide and 10 narrow deflector box assemblies. As removal/installation procedure is identical for all wide boxes, and for all narrow boxes, only removal/installation of one of each is detailed below.

A. Remove Wide Deflector Box Assembly

CAUTION: THE WEIGHT OF A WIDE DEFLECTOR BOX ASSEMBLY IS APPROXIMATELY 17 LB. (7.7 KG.) (S.B.78-2160).

(1) Operate thrust reverser to reverse thrust position (Ref. 78-30-00, Adjustment/Test).

CR NOTE: There is insufficient clearance to remove the No.11
CR cascade on some engines when sleeve is cranked back to
CR the reverse thrust position. In order to aid the
CR removal of the No.11 cascade vane without overcranking
CR the translating sleeve, it is permissible to cut of
CR 3/8inch of the spade end of the swivel flap assembly
CR as indicated in fig.201.


CAUTION: MANUAL CRANKING OF THE THRUST REVERSER TRANSLATING SLEEVE BEYOND THE TOTAL TRAVEL DIMENSION OF 27.65 INCHES CAN CAUSE A 'LONG STROKING' PNEUMATIC DRIVE UNIT RESULTING IN DAMAGE TO CABLE, BALLSCREW ASSEMBLIES ETC, IN ADDITION TO THE DRIVE UNIT DAMAGE CAUSED BY THE OVERCRANKING
CASCADE VANES
3/8" CUT-OFF TO REMOVE No 11 CASCADE VANE
1
1
1
1
1
2
SWIVELLING FLAPS
98720

CR Deflector vane swivelling flap and spring
CR mechanism - lubrication points
CR Fig.201

(2) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref. 78-30-00, Servicing).

(3) Refer to fig.202, support deflector box assembly (2) forward end and remove bolts and washers (1).

In the event that deflector box assembly being removed is from No.11 position on engine No.1 or No.2 (Ref. fig.204 or 205), remove nose fairing cover assembly from deflector box assembly forward L.H. corner. On engines with S.B.78-5893 the nose fairing cover is attached at the forward end by three bolts and washers. On engines without S.B.78-5893 the nose fairing cover is attached at the forward end by four bolts and washers.

NOTE: On engines with S.B.78-3607, the nose fairing cover assembly is manufactured in one piece. On engines without S.B.78-3607 or with S.B.78-5011, the nose fairing cover assembly is manufactured in three pieces.

(4) Move deflector box assembly (2) inward and forward to disengage locating pins from rear swivel pin housings and lift out deflector box assembly rear end first.

B. Install Wide Deflector Box Assembly

(1) Equipment required:

Inspection mirror and lamp

(2) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation A.(2).

(3) Refer to appropriate figure and identify box to be fitted:

Fig.204 - engine No.1 (left-hand)
Fig.205 - engine No.2
Fig.206 - engine No.3 (right-hand)

NOTE: 1. The engine positions (i.e. 1 to 20) are marked on the rear face of the engine firewall.

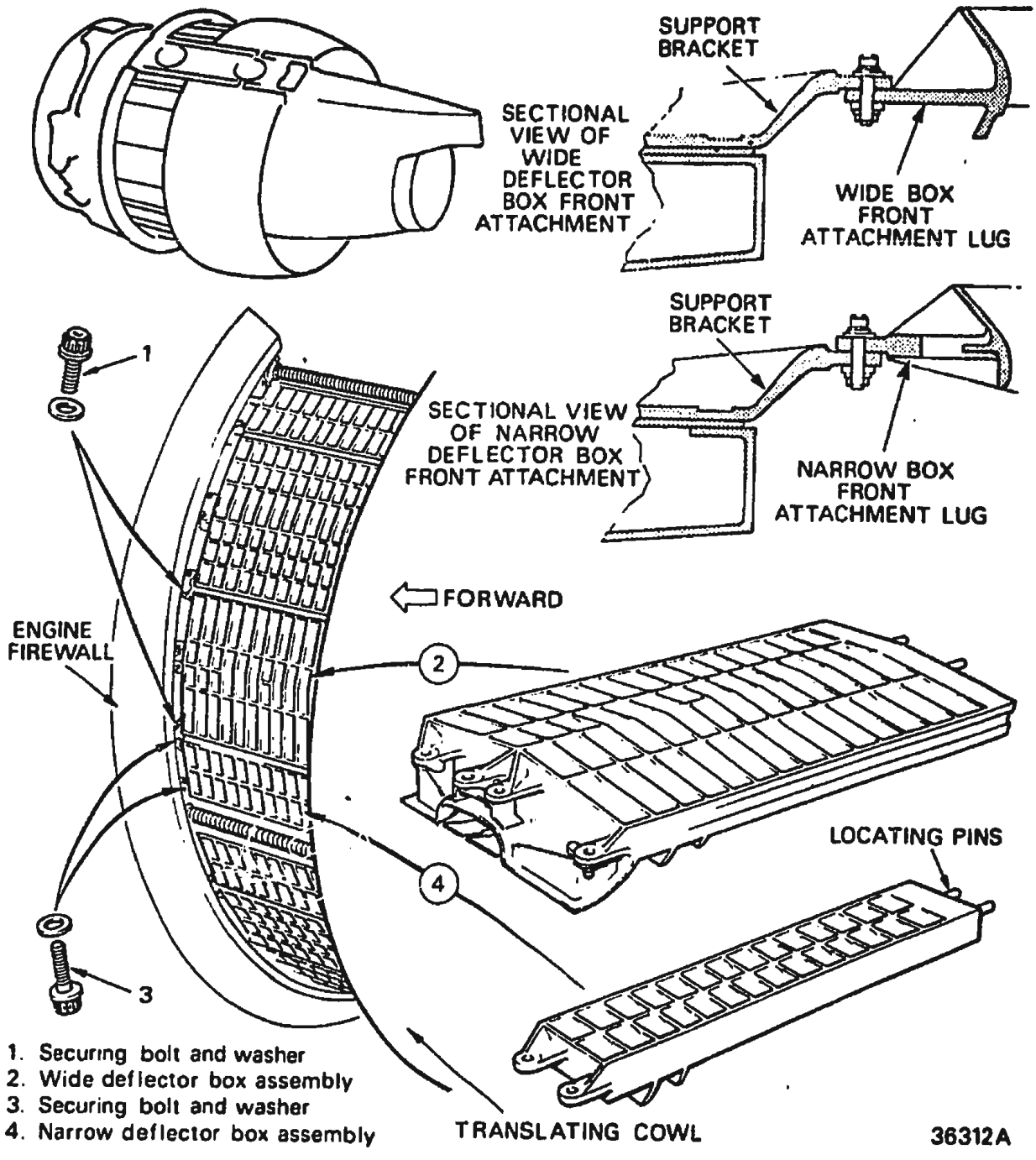
2. An identification plate is attached to each box giving the engine positions at which the box can be fitted.

e.g. A plate bearing the identification 3L. 7L. 19C. 15LR. can be fitted in any one of the following positions:

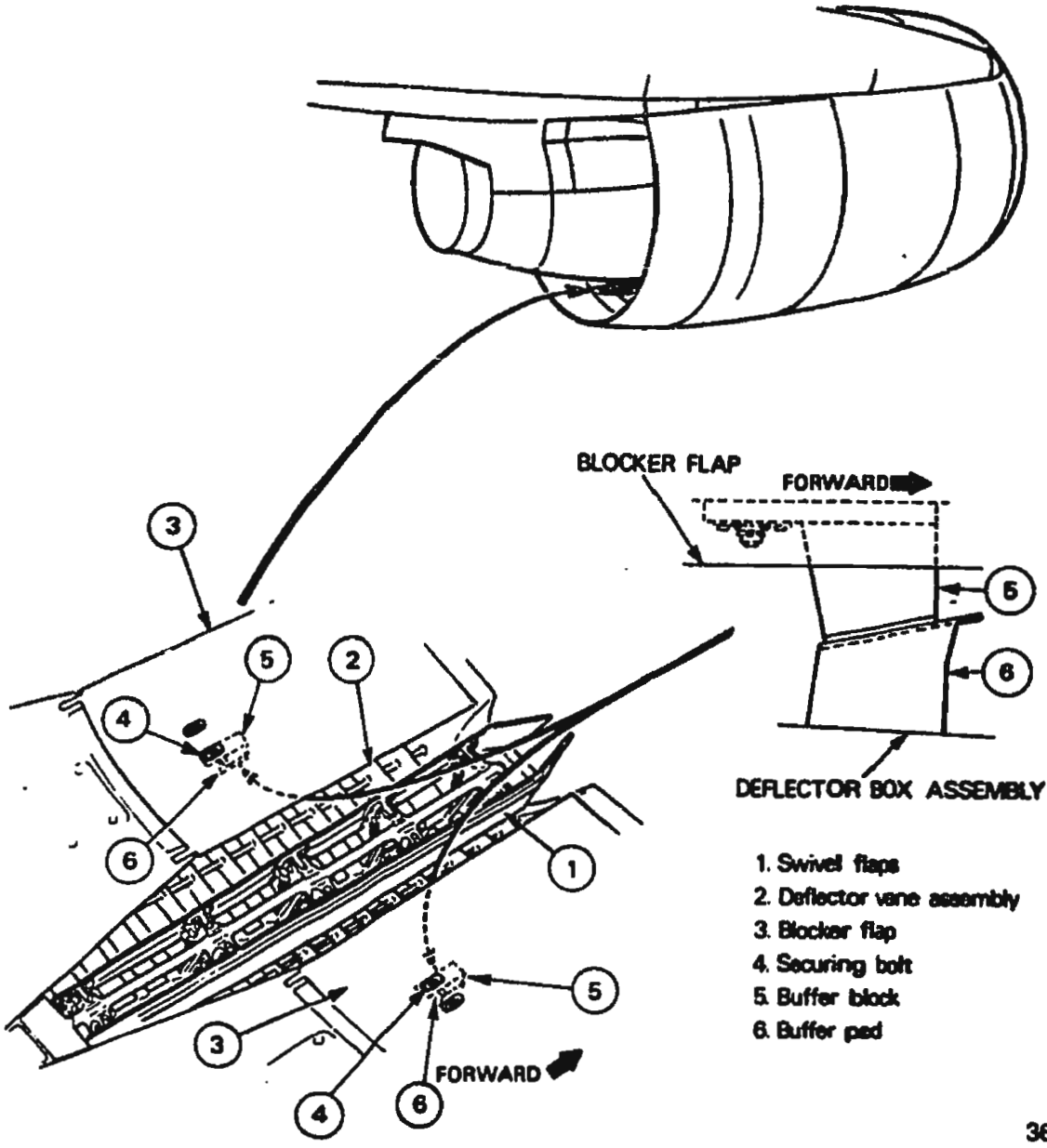
3L - No.3 position, left hand (No.1) engine
7L - No.7 position, left-hand engine
19C - No.19 position, centre (No.2) engine
15LR) - No.15 position left-hand engine
) - No.15 position, right-hand (No.3) engine

(4) Refer to fig.203, slacken bolts (4) on appropriate blocker flap (3), slide buffer block (5) rearward and secure bolts (4).

(5) Refer to fig.202, if new deflector box assembly (2) is being fitted to No.11 position on No.1 or No.2 engine, remove nose fairing cover assembly from box. Position box in cold stream duct with front attachment lugs inside support brackets. Move box rearward and locate pins in swivel pin housings on reverser case rear flange. Move box outward toward support brackets. In No.11 position when box is clear of compressor section lower fairing (Ref. 72-03-00), fit nose fairing cover. Align bolt holes in attachment lugs with holes in support brackets, fit and secure bolts and washers (1).



Deflector vane Removal/Installation
Fig.202



Set buffer assembly
Fig.203

(6) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

(7) Operate thrust reverser to forward thrust position (Ref. 78-30-00, Adjustment/Test).

(8) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref. 78-30-00, Servicing).

(9) Refer to fig.203, open swivel flaps (1) and hold open. Slacken bolt (4) and viewing (if possible) with inspection mirror and lamp, adjust buffer block (5) until it abuts buffer pad (6) on deflector vane assembly (2); tighten bolt (4) and release swivel flap.

(10) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing)

C. Remove Narrow Deflector Box Assembly

(1) Operate thrust reverser to reverse thrust position (Ref. 78-30-00, Adjustment/Test).

(2) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref. 78-30-00, Servicing).

(3) Refer to fig.202, support deflector box assembly (4) front end and remove bolts and washers (3).

NOTE: On engines with S.B.78-3224 the deflector box assembly attachment lugs are of increased thickness and secured by longer bolts.

(4) Move deflector box assembly (4) outward and forward to disengage locating pins from rear swivel pin housings and lift box clear.

D. Install Narrow Deflector Box Assembly

(1) Equipment required:

Inspection mirror and lamp

(2) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation C.(2).

(3) Refer to appropriate figure and identify box to be fitted:

Fig.204 - engine No.1 (left-hand)
Fig.205 - engine No.2
Fig.206 - engine No.3 (right-hand)

NOTE: 1. The engine positions (i.e. 1 to 20) are marked on the rear face of the engine firewall.

NOTE: 2. An identification plate is attached to each box giving the engine positions at which the box can be fitted.

e.g. A plate bearing the identification 1C. 4L. 12LCR. 13R. 16C. 5LR can be fitted in any one of the following positions:

1C - No.1 position centre (No.2) engine
4L - No.4 position left-hand (No.1) engine
12CLR)- No.12 position left-hand engine
)- No.12 position centre engine
)- No.12 position right-hand (No.3) engine
13R - No.13 position right-hand engine
16C - No.16 position centre engine
15LR) - No.15 position left-hand engine
) - No.15 position right-hand engine

(4) Refer to fig.203, slacken bolts (4) on appropriate blocker flap (3), slide buffer block (5) rearward and secure bolts (4).

(5) Refer to fig.202, engage locating pins in their respective swivel pin housings on reverser case rear flange. Position front attachment lugs on outside of support bracket, align bolt holes, fit and secure bolts and washers (3).

NOTE: On engines with S.B.78-3224 the deflector box assembly attachment lugs are of increased thickness and secured by longer bolts.

(6) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

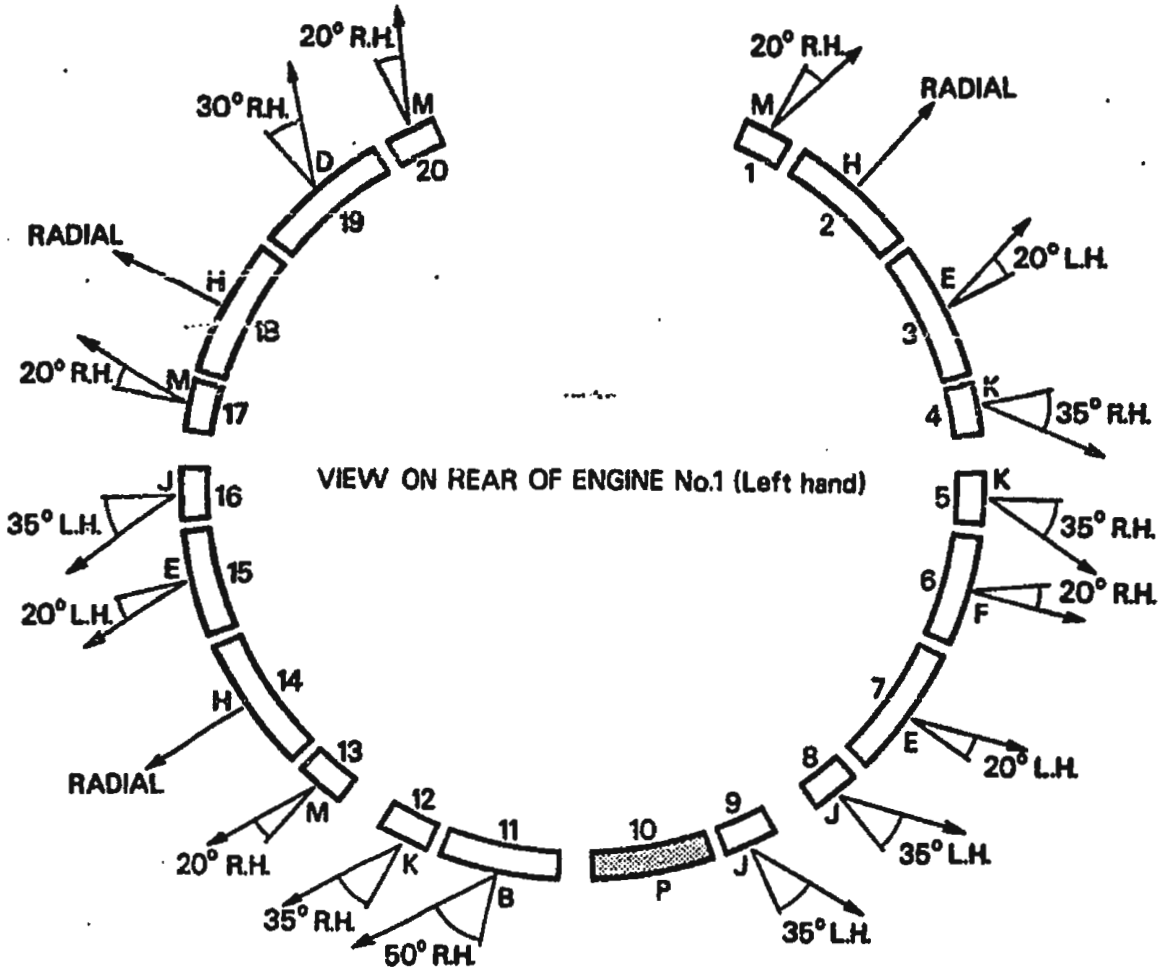
(7) Operate thrust reverser to forward thrust position (Ref. 78-30-00, Adjustment/Test).

(8) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS

Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref. 78-30-00, Servicing).

(9) Effect operation B.(9).

(10) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).



VIEW ON REAR OF ENGINE No.1 (Left hand)

WIDE DEFLECTOR BOX ASSEMBLY
REF. LOCATION (Embossed Identification)

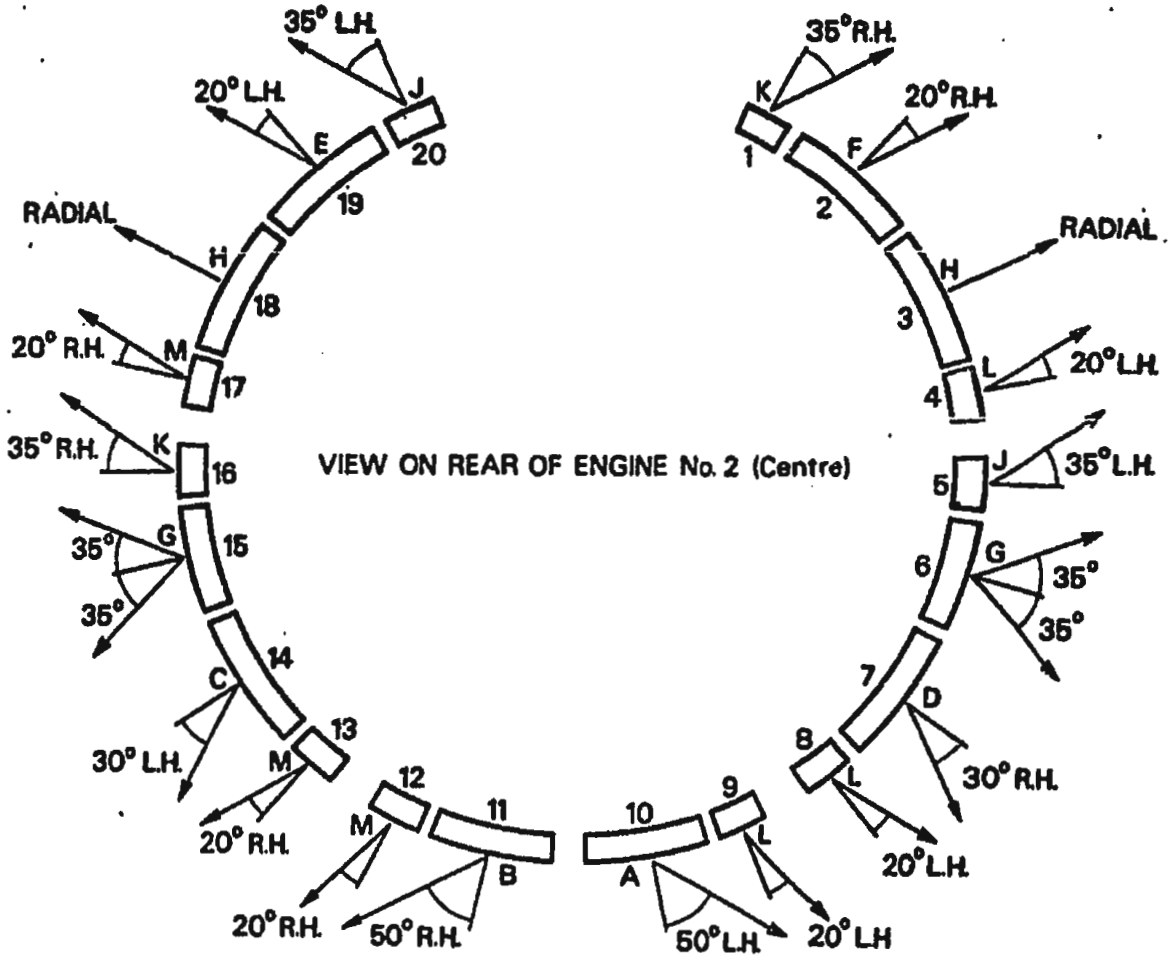
B	11LC					
D	19L	7C				
E	3L	7L	19C	15LR		
F	2C	18R	6LR	14R		
H	2L	14L	18LC	3CR	7R	19R
P	(Blank)	10L	11R			

NARROW DEFLECTOR BOX ASSEMBLY
REF. LOCATION (Embossed Identification)

J	8L	17R	9LR	5C	20C	16LR
K	1C	4L	12LR	13R	16C	5LR
M	1L	20L	17LC	13L	13C	12C

58560A

Engine No.1 deflector box assembly, turning angles locations and alternative positions
Fig.204



WIDE DEFLECTOR BOX ASSEMBLY
REF. LOCATION (Embossed Identification)

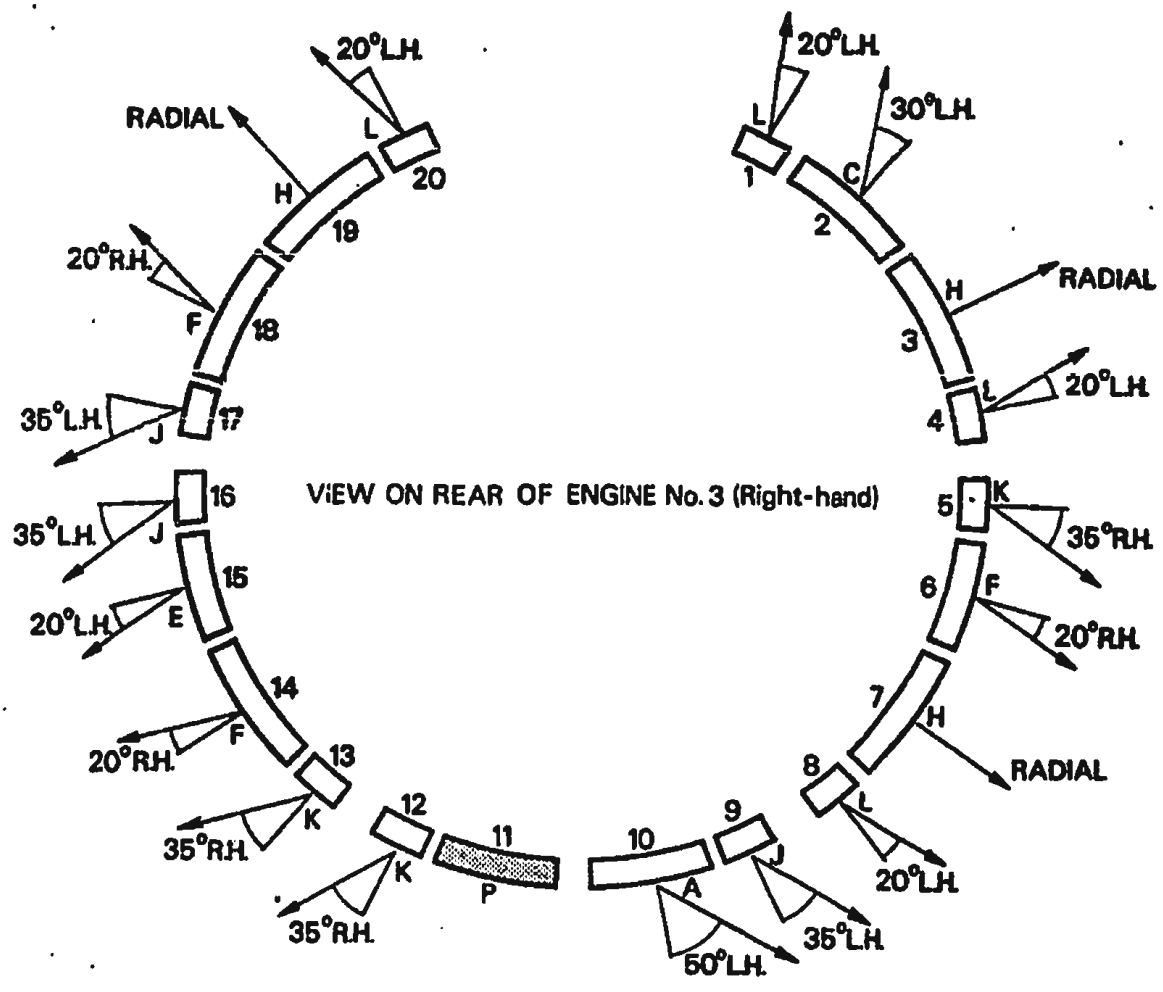
A	10CR					
B	11LC					
C	14C	2R				
D	19L	7C				
E	3L	7L	19C	15LR		
F	2C	18R	6LR	14R		
G	6C	15C				
H	2L	14L	18LC	3CR	7R	19R

NARROW DEFLECTOR BOX ASSEMBLY
REF. LOCATION (Embossed Identification)

J	8L	17R	9LR	5C	20C	16LR
K	1C	4L	12LR	13R	16C	5LR
L	1R	20R	4CR	8R	8C	9C
M	1L	20L	17LC	13L	13C	12C

58581A

Engine No.2 deflector box assembly
locations, turning angles and alternative positions
Fig.205



WIDE DEFLECTOR BOX ASSEMBLY
REF. LOCATION (Embossed Identification)

A	10CR					
C	14C	2R				
E	3L	7L	19C	15LR		
F	2C	18R	6LR	14R		
H	2L	14L	18LC	3CR	7R	19R
P	(Blank)	10L	11R			

NARROW DEFLECTOR BOX ASSEMBLY
REF. LOCATION (Embossed Identification)

J	8L	17R	9LR	5C	20C	16LR
K	1C	4L	12LR	13R	16C	5LR
L	1R	20R	4CR	8R	8C	9C

58562A

Engine No.3 deflector box assembly turning angles locations and alternative positions
Fig.206

DEFLECTOR VANE (CASCADE) - INSPECTION/CHECK

C 1. Inspection

C A. General Inspection

C (1) Inspect Cascade Vane assemblies for cracks.

C (2) Inspect nose deflector fairings for cracks, dents, and
C distortion.

C (3) Inspect swiveling flap assemblies for cracks, security
C of attachment, smooth movement of mechanism, and
C excessive wear of moving parts.

C (4) Inspect Cascade Vane assembly rear mounting pins for
C security of attachment.

C (5) Inspect position mounting plate for legibility and
C security of attachment.

C B. Acceptance Standards (See Fig.601 for Identification)

C (1) Vane Assemblies

C (a) Cracks in vane assembly structure (stringers) are
C not acceptable.

C (b) Cracks or local damage to individual vanes up to
C .50 inch depth provided crack or damage is blended
CR and surface reprotected, or vanes are removed.

C (c) Loose rear mounting pins are not acceptable.

C (d) Deteriorated surface protection should be touched up
C with zinc chromate primer.

C (e) Cracks or local damage to nose deflector fairings up
C to .50 inch long are acceptable provided end of
C crack is stop drilled or local damage is radiused
C out.

CR (f) Dents up to 2.0 inch in diameter and .250 inch deep
CR in nose fairing are acceptable.

CR (2) Blanking Cascade Assemblies

CR (a) Cracked or broken main structure, loose mounting
CR pins or brackets and punctures are not acceptable.

CR (b) Dents up to 2.00 inch diameter and .50 inch deep
CR are acceptable.

CR (c) Missing side rub strips are acceptable.

CR (d) Nose fairing standards per B. (1) (e) & (f).

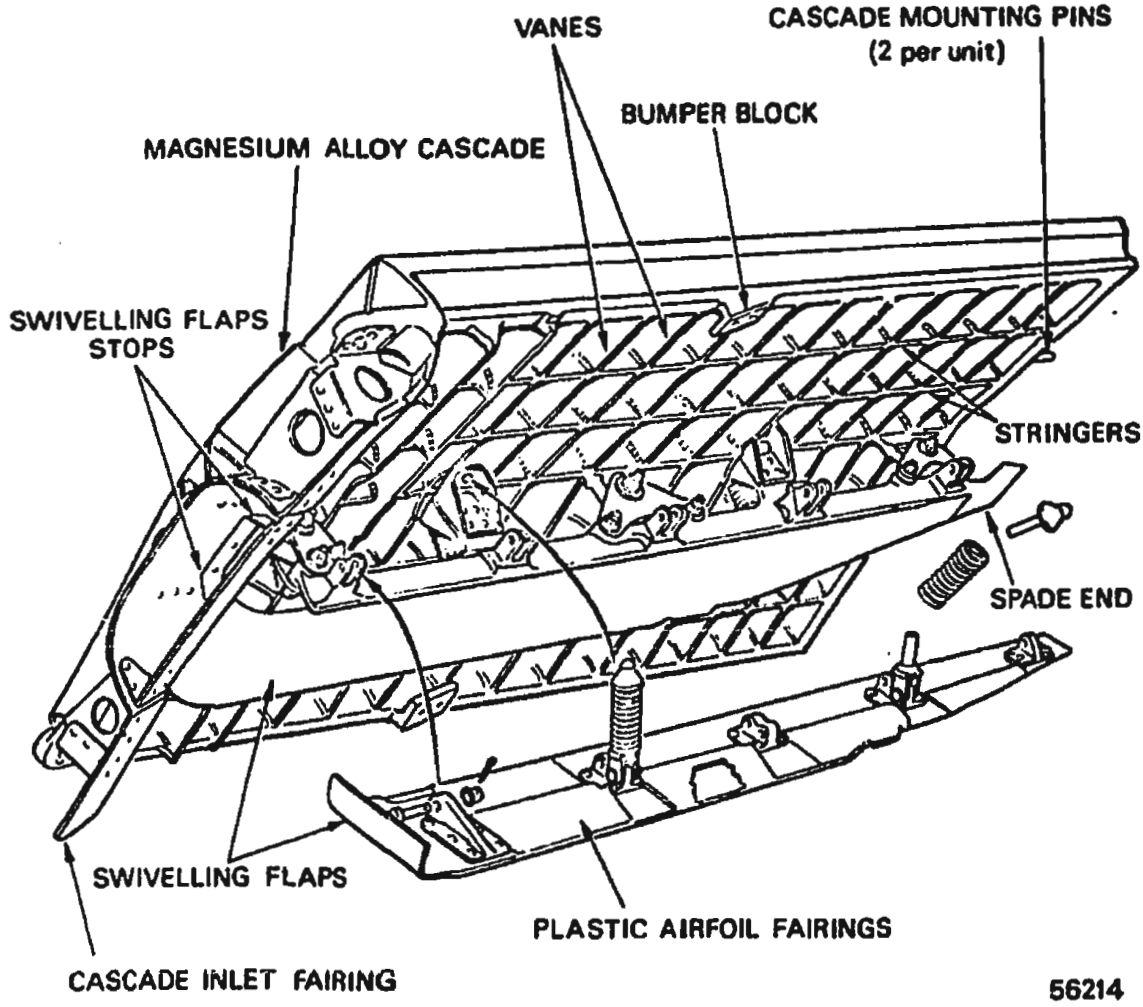
CR (3) Swiveling flap assemblies

CR (a) Loose attachments, stiff movement, and cracks in
CR main structure are not acceptable.

CR (b) Cracks in swiveling flaps up to .50 inch long are
CR acceptable, providing end of crack is stop drilled.

CR (c) Up to two (2) plastic airfoil fairings may be
CR missing from the underside of each flap.

CR (d) One half of the "Spade End" of the assembly may be
CR missing.



C Cascade vane assembly identification
C Fig.601

LOCK SEQUENCING VALVE - MAINTENANCE PRACTICES

1. Removal/Installation Lock Sequencing Valve

Service Bulletins referred to:

S.B.71-2469 - Lock Mechanism with increased clearance.

Referenced Procedures

70-51-00	Torque Tightening Techniques
71-00-00	Power Plant - Adjustment/Test
71-11-00	R.H. Hinged Cowl, Engines No.1 and 3 - Servicing
71-12-05	R.H. Upper Hinged Cowl, Engine No.2 - Servicing
78-30-00	Thrust Reverser - Servicing
78-30-00	Thrust Reverser - Adjustment/Test

Illustrated Parts Catalogue

The I.P.C. sections where parts disturbed during the following operations may be located are as follows:

78-31-05	Engine Mounted Air Tubes
78-31-35	Lock Sequencing Valve
78-31-41	Translating Cowl Locking Mechanism

A. Remove Lock Sequencing Valve

(1) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN THE FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00, Servicing).

(2) Open right-hand hinged cowl 414A or 424A for engine No.1 or No.3 (Ref. 71-11-00) or 434DR for engine No.2 (Ref. 71-12-05).

(3) Refer to fig.201, disconnect connectors (1) and (2).

(4) Remove bolt and nut (3).

On engines incorporating S.B.71-2469, remove nut, washer and bolt (3).

(5) Remove bolts (4).

(6) Remove bolt and nut (5) then remove valve.

(7) Fit approved blanks to all connectors and exposed apertures.

B. Install Lock Sequencing Valve

(1) Materials required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Lockwire	DTD.189A 22 S.W.G.	21 A.W.G.	238

(2) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation A.(1).

(3) Remove blanks from all connectors and apertures.

(4) Position valve on engine, fit and secure bolt and nut (5).

(5) Fit and secure bolts (4).

(6) Fit and secure bolt and nut (3).

On engines incorporating S.B.71-2469, fit and secure bolt, washer, nut and new cotter pin (8).

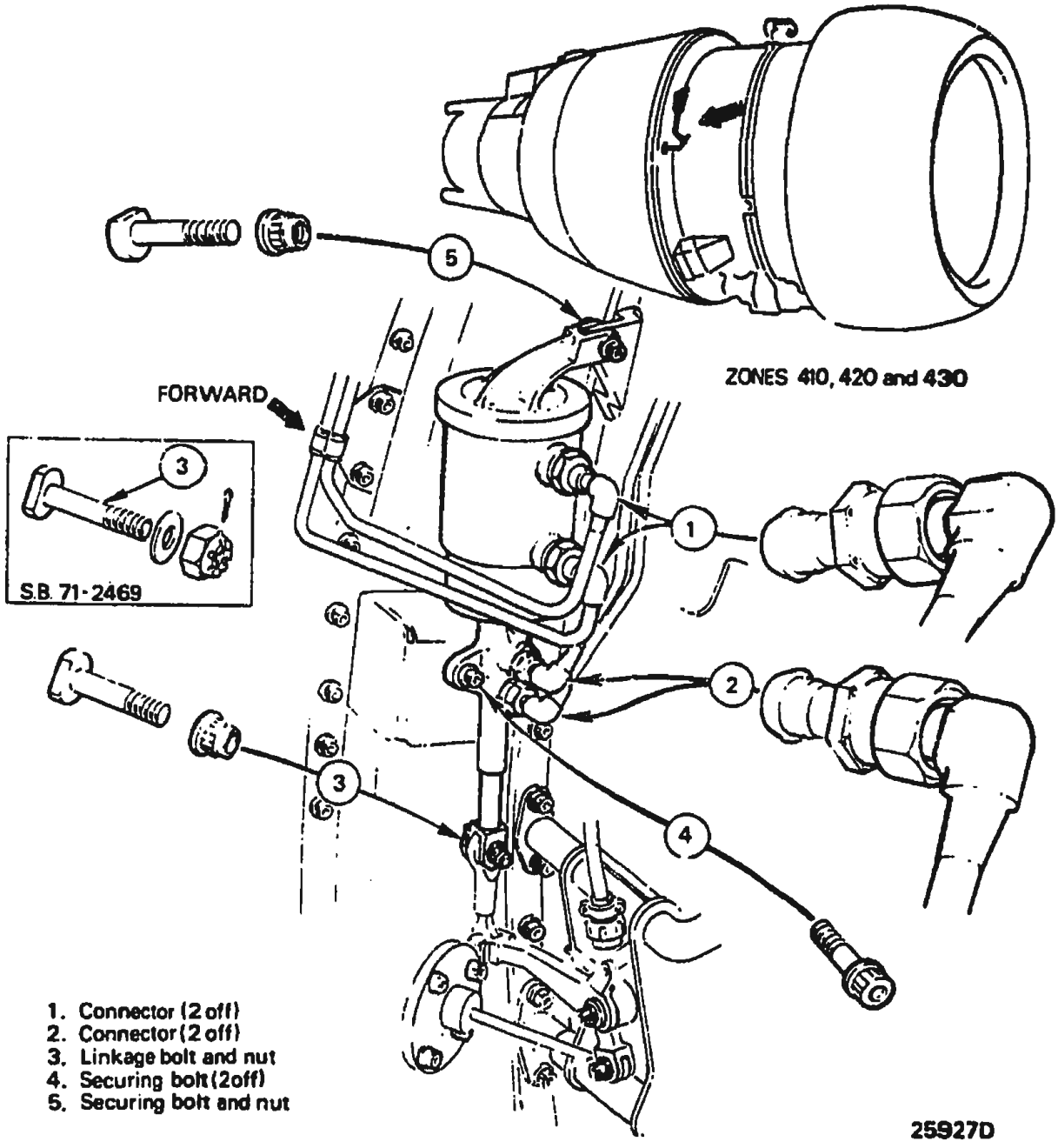
(7) Connect and secure (Ref. 70-51-00) connectors (1) and (2) and wirelock.

(8) Set translating cowl lock mechanism (Ref. 78-30-00, Adjustment/Test).

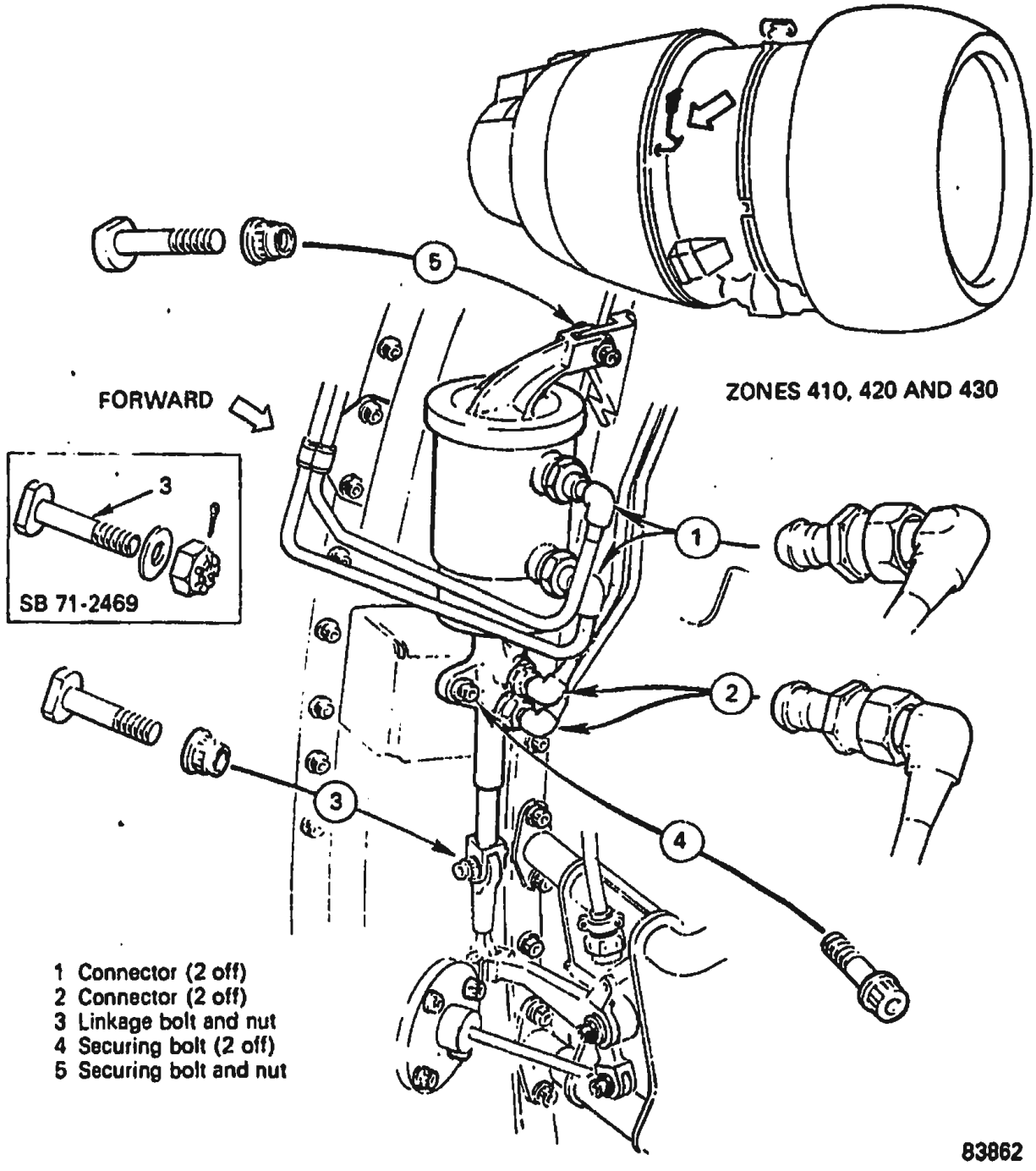
(9) Close right-hand hinged cowl 414A or 424A for engine No.1 and No.3 (Ref. 71-11-00), or 434DR for engine No.2 (Ref. 71-12-05).

(10) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

(11) Before next flight functionally test thrust reverser system (Ref. 78-30-00, Adjustment/Test).



Lock sequencing valve disconnect points - Engines without S.B.78-7185
Fig.201 Sheet 1



R Lock sequencing valve disconnect points - Engines with S.B.78-7185
R Fig.201 Sheet 2

R # TRANSLATING COWL LOCKING MECHANISM - SERVICING

R 1. General

R Referenced Procedures:

R	71-11-00	R.H. Hinged Cowl, Engines No.1 and No.3 - Servicing
R	71-12-05	R.H. Upper Hinged Cowl, Engine No.2 - Servicing
R	78-30-00	Thrust Reverser - Servicing and Adjustment/Test

R 2. Lubricate R.H. Lock Sequencing Valve Linkage and Lock Mechanism

R A. Material Required:

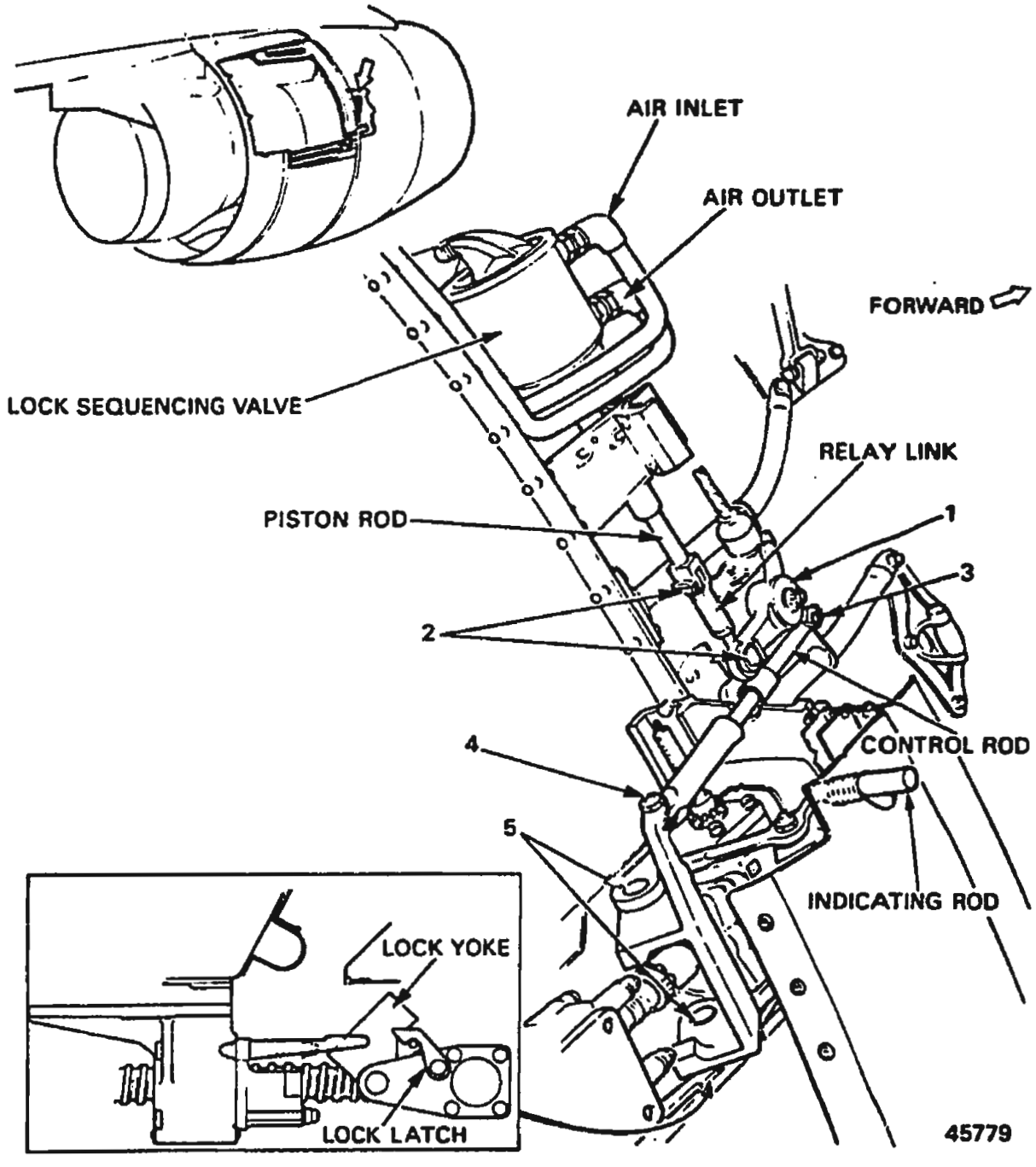
		British Spec./Ref.	American Spec./Ref.	OMat Item No.
R	Anti-corrosion inhibiting fluid	Rocket W.D.40	-	1042

R B. WARNING: ENSURE THE THRUST REVERSER AND ASSOCIATED SYSTEMS ARE DEACTIVATED AND TAGGED WHILE WORK IS IN PROGRESS (REF. 78-30-00, SERVICING).
Manually cycle thrust reverser to the mid-position (Ref. 78-30-00, Adjustment/Test).

R C. Open right-hand hinged cowls 414A or 424A for engines No.1 or No.3 (Ref. 71-11-00) or 434DR for engine No.2 (Ref. 71-12-05).

R D. Refer to fig.301, lubricate R.H. lock sequencing valve linkage and lock mechanism with anti-corrosion inhibiting fluid at points 1 to 5.

R E. Wipe away any surplus lubricant.



R R Translating cowl R.H. Lock - Lubrication points
Fig.301

R F. Manually operate lock mechanism for freedom of movement.

R NOTE: It will be necessary to manually lift the lock latch
R to permit repeat operation of the lock mechanism.

R G. Close right-hand hinged cowls 414A or 424A for engines
R No.1 or No.3 (Ref. 71-11-00) or 434DR for engine No.2
R (Ref. 71-12-05).

R H. Manually cycle thrust reverser to forward thrust
R position (Ref. 78-30-00, Adjustment/Test).

R I. Reactivate thrust reverser and associated systems
R (Ref. 78-30-00, Servicing).

R J. Functionally test thrust reverser system (Ref. 78-30-00,
R Adjustment/Test).

TRANSLATING COWL LOCKING MECHANISM - REMOVAL/INSTALLATION

In the event of a thrust reverser system failure that prevents thrust reverser operation to reverse thrust position or the translating cowl being manually cycled rearwards, carry out manual traversing procedure (Ref.78-31-07).

The Removal/Installation procedures detailed in this section are as follows:

	Paragraph	Procedures
	1.	Removal/Installation Crush Tubes and Bolts
R	A.	Remove Crush Tubes and Bolts
R	B.	Install Crush Tubes and Bolts
	2.	Removal/Installation Centre Gearbox Lock Latch
	A.	Remove Lock Latch - Engines without S.B.78-3852
R	B.	Install Lock Latch - Engines without S.B.78-3852
	C.	Remove Lock Latch - Engines with S.B.78-3852
	D.	Install Lock Latch - Engines with S.B.78-3852
	3.	Removal/Installation Mechanical Drive Lock Probe
	A.	Remove Mechanical Drive Lock Probe - Engines without S.B.78-3853
	B.	Install Mechanical Drive Lock Probe - Engines without S.B.78-3853
	C.	Remove Mechanical Drive Lock Probe - Engines with S.B.78-3853
	D.	Install Mechanical Drive Lock Probe - Engines with S.B.78-3853

1. Removal/Installation Crush Tubes and Bolts

Service Bulletins referred to:

S.B.78-3637 - Translating Cowl Locking Mechanism - Reduced Length 'D' Head Bolts and Tubes

R S.B.78-3275 - Translating Cowl Guide Rail Mounting and
R Nut Housing - Revised Shims.

Referenced Procedures:

78-30-00	Thrust Reverser - Servicing and Adjustment/Test
78-31-07	Translating Cowl - Maintenance Practices

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

78-31-36	Translating Cowl Locking Mechanism - Thrust Reverser Mounted

Removal/Installation of crush tubes and bolts for the right and left-hand locking mechanisms is identical but opposite handed. Therefore the following procedure applies to either.

R A. Remove Crush Tubes and Bolts

NOTE: 1. For ease of maintenance it is recommended that not more than two crush tube and bolt assemblies are removed together.

2. To improve access for the Removal/Installation of the crush tubes and bolts, it may prove advantageous to remove the two adjacent narrow cascades (Ref.78-31-20 Maintenance Practices).

R (1) Equipment required:

R HU.20163/1 Socket spanner

R (2) WARNING: ENSURE THRUST REVERSER AND ASSOCIATED SYSTEMS ARE DEACTIVATED AND TAGGED WHILE WORK IS IN
R PROGRESS (REF.78-30-00 SERVICING).
Manually cycle thrust reverser to mid-position (Ref. 78-30-00, Adjustment/Test).

R (3) Refer to fig.401 Sheet 1, remove fasteners (1) and
R upper R.H. panel (2) and/or remove fasteners (3)
R and upper L.H. panel (4), as applicable.

R (4) Remove bolts and washers (5) from translating cowl
R and mechanical drive housing.

R (5) Remove tri-wing screws (6) from translating cowl ring
R assembly and mechanical drive housing.

R NOTE: The tri-wing screws (6) can be extracted through
R the translating cowl.

R (6) On engines without S.B.78-3275 remove packing block (7)
R and shim (8).

R NOTE: On engines with S.B.78-3275 the packing block (7)
R and shim (8) are riveted to the translating cowl
R ring assembly (jury ring).

R (7) Using socket spanner, disconnect flexible drives (9) and (10).

R (8) Refer to fig.401 (Sheet 2) manually rotate screwjack (1) until access to crush tubes (4) and bolts (5) is easily obtained.

R (9) Remove nuts (2), collars (3) or S.B.78-3637, washers (3) and crush tubes (4).

R (10) Withdraw bolts (5) from mechanical drive housing.

R B. Install Crush Tubes and Bolts

R (1) Material required

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Locking compound	Locktite 'CV'	Locktite 'CV'	853
Degreasing fluid (Inhibited and stabilised 1.1.1. trichloroethane)	B.S.4487 1969	Mil-T-81533	1/21

R (2) Ensure thrust reverser and associated systems are deactivated, tagged and positioned as detailed in operation 1.A.(2).

R (3) Refer to fig.401 (Sheet 2), insert bolt (5) from rear
R of mechanical drive housing, ensuring bolt head flats
R align with flats on mechanical drive housing.

R WARNING: WHEN USING DEGREASING FLUID ENSURE ADEQUATE
R VENTILATION, AVOID SKIN CONTACT AND INHALING
R THE VAPOUR.

R On engines with S.B.78-3637, using degreasing fluid
R clean mating threads of bolts (5) and nuts (2), allow
R to dry. Insert bolts (5) from rear of mechanical
R drive housing, ensuring bolt head flats align with
R flats on mechanical drive housing.

R (4) Position crush tubes (4) and collars (3) or
R S.B.78-3637 washers (3) on bolts (5). On pre
R S.B.78-3637 position collars smaller external diameter
R leading, and locate in end of crush tube.

R (5) Fit nuts (2) and torque tighten to 30-45 lb.ins.
R (3.390-5.085 Nm). On engines with S.B.78-3637,
R apply locking compound to threads of bolts (5),
R fit nuts (2) and torque tighten to 22-24 lb.ins.
R (2.486-2.712 Nm.)

R (6) Manually rotate screwjack (1) to align mechanical
R drive housing with attachment location on
R translating cowl ring assembly.

R (7) Refer to fig.401 (Sheet 1), on engines without
R S.B.78-3275 fit packing block (7) and shim (8).

R (8) Fit tri-wing screws (6) to translating cowl ring
R assembly and mechanical drive housing.

R (9) Fit bolts and washers (5) securing the translating
R cowl to the mechanical drive housing.

R (10) Using socket spanner, fit flexible drive connectors
R (9) and (10) and torque tighten to 40-50 lb.ins.
R (4.520-5.650 Nm).

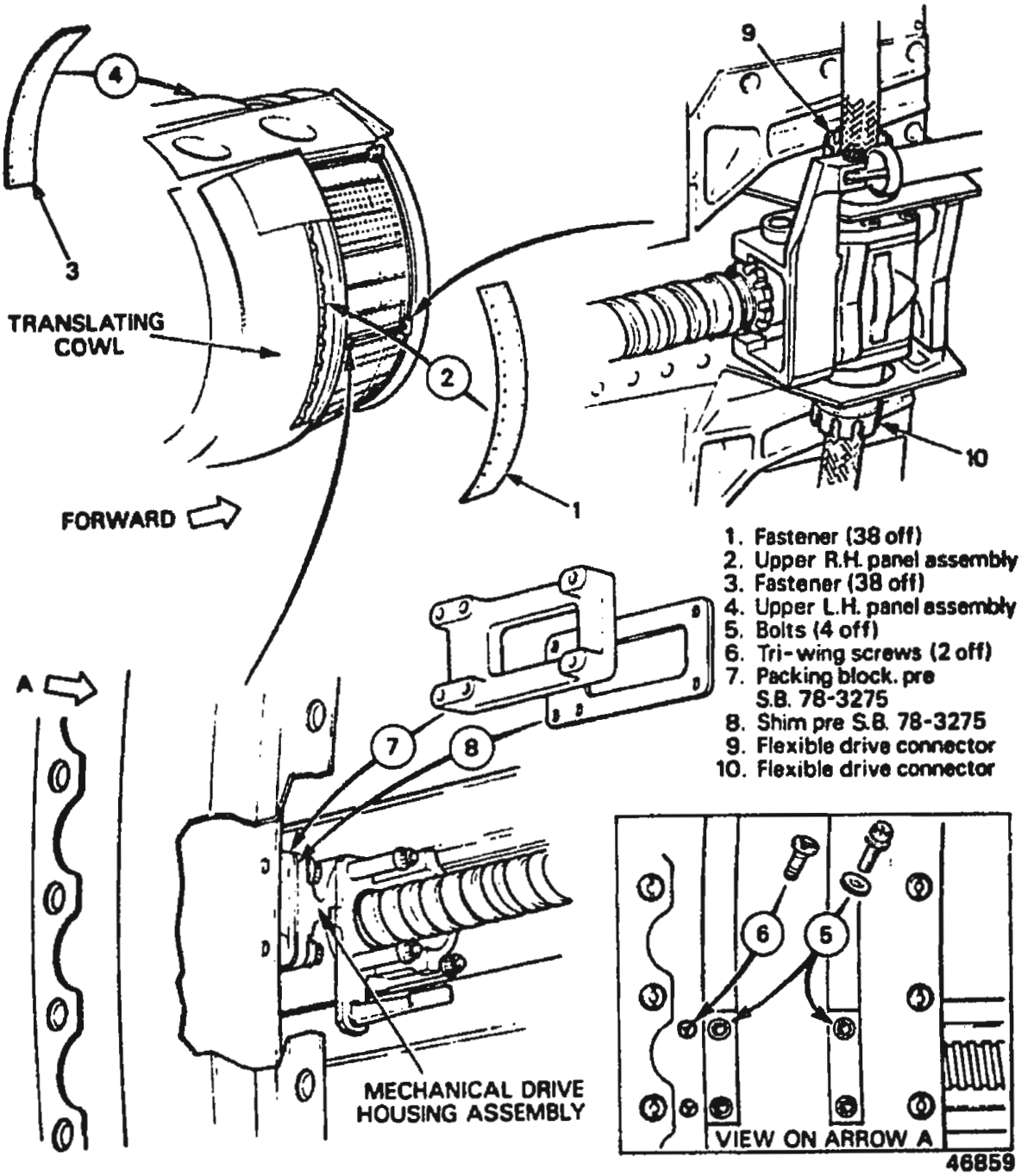
R (11) Fit upper R.H. panel (2) secure with fasteners (1),
R and/or fit upper L.H. panel (4) and secure with
R fasteners (3).

R (12) Manually cycle thrust reverser to forward thrust position (Ref.78-30-00, Adjustment/Test).

R (13) Reactivate thrust reverser and associated systems (Ref.78-30-00, Servicing).

R (14) Ensure locks are fully engaged by checking that the lock indicator rod is retracted and flush with the firewall.

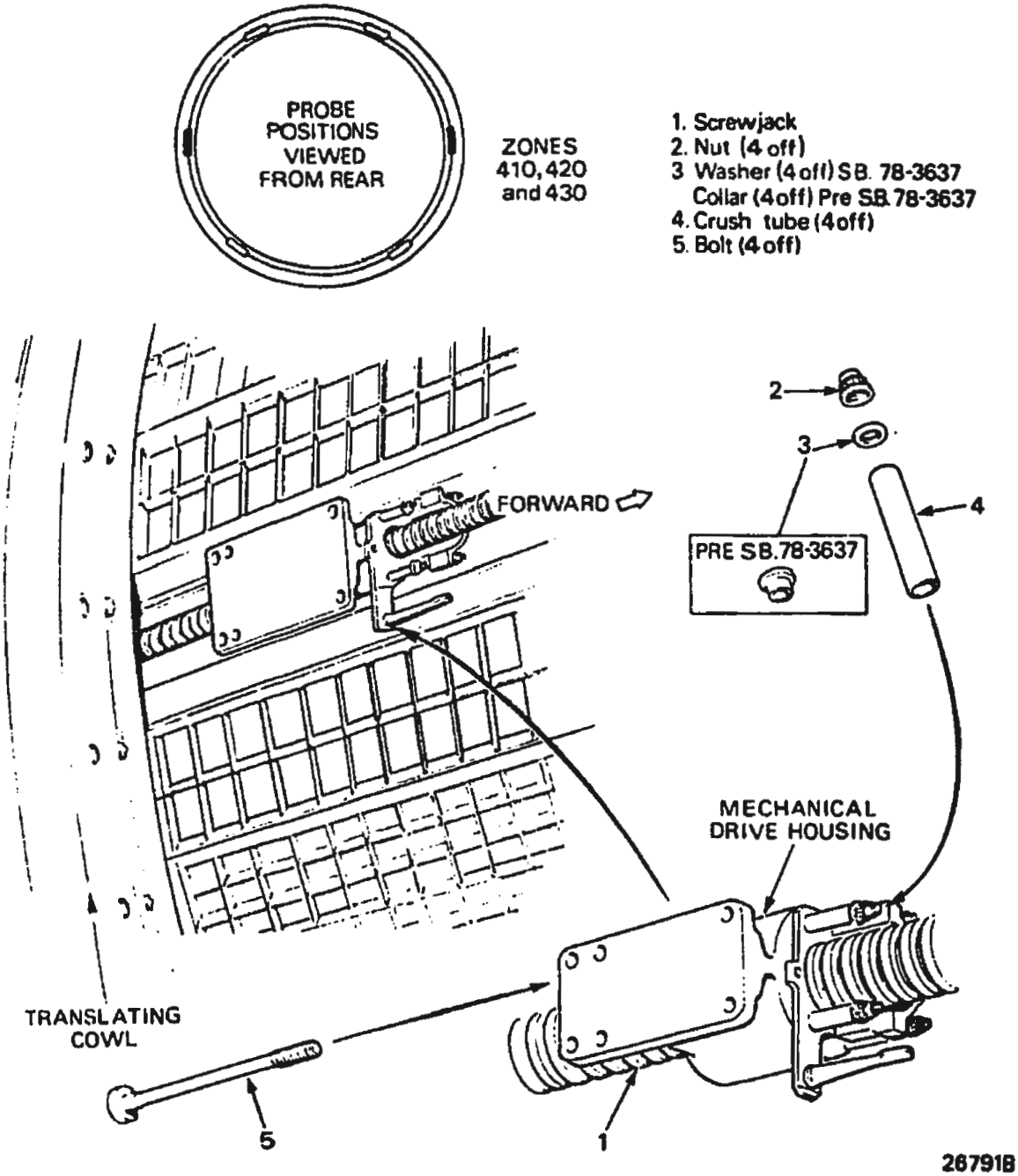
R (15) Before next flight, functionally test thrust reverser system (Ref.78-30-00, Adjustment/Test).



1. Fastener (38 off)
2. Upper R.H. panel assembly
3. Fastener (38 off)
4. Upper L.H. panel assembly
5. Bolts (4 off)
6. Tri-wing screws (2 off)
7. Packing block. pre S.B. 78-3275
8. Shim pre S.B. 78-3275
9. Flexible drive connector
10. Flexible drive connector

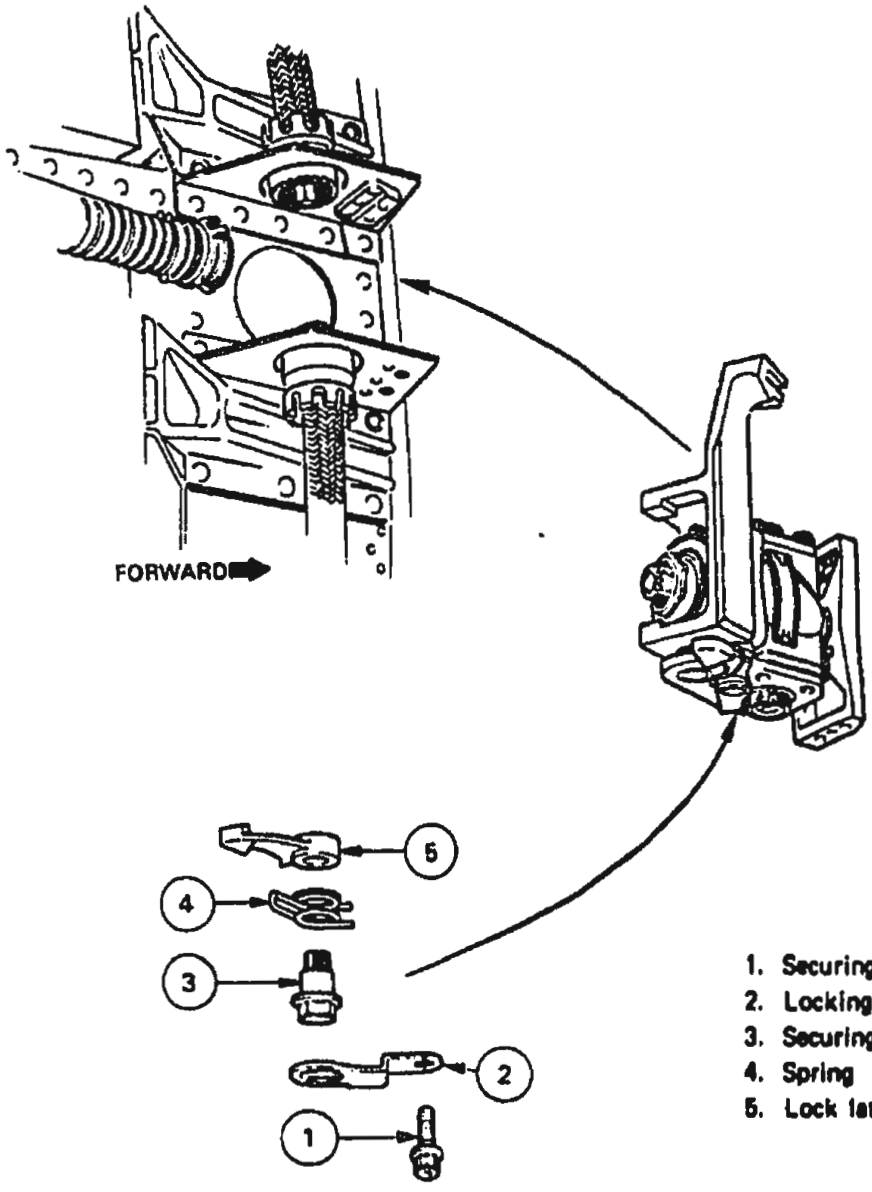
R R Crush tubes and bolts - Removal/Installation
Fig.401 (Sheet 1)

EFFECTIVITY: ALL



R Crush tubes and bolts - Removal/Installation
R Fig.401 (Sheet 2)

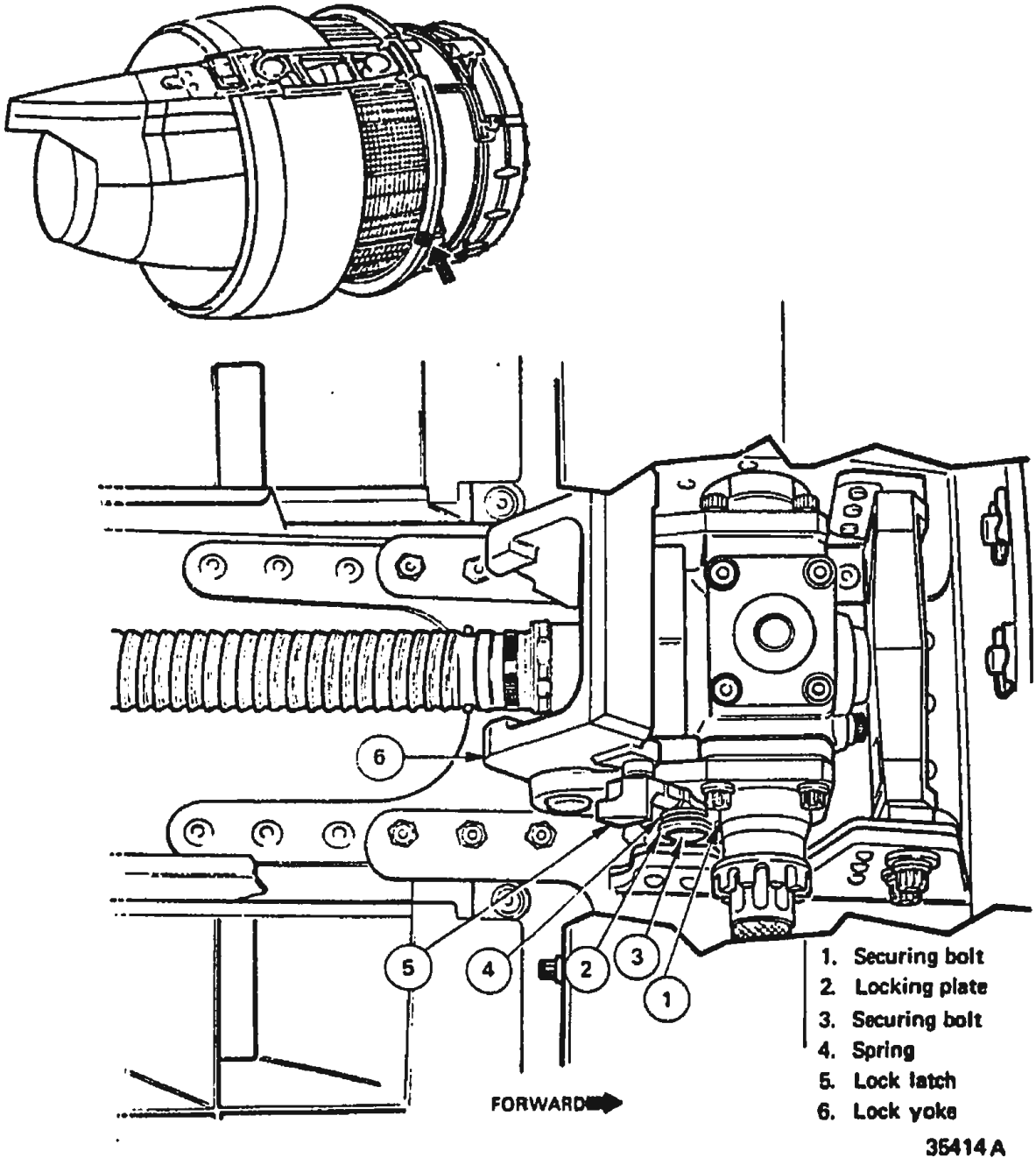
EFFECTIVITY: ALL



1. Securing bolt
2. Locking plate
3. Securing bolt
4. Spring
5. Lock latch

35413A

Translating cowl lock latch - Removal/Installation
(engines without S.B.78-3852)
Fig.402



Translating cowl lock latch - Removal/Installation
(engines with S.B.78-3852)
Fig.403

2. Removal/Installation Centre Gearbox Lock Latch

Service Bulletin referred to:

S.B.78-3852 - Translating Cowl Locking Mechanism - Access to Lock Latch

Referenced Procedures:

78-31-17 Translating Cowl Gearbox - Removal/Installation

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

78-31-36 Translating Cowl Locking Mechanism Thrust Reverser Mounted

Removal/Installation of the right and left-hand lock latch is identical but opposite handed. Therefore the following procedure applies to either.

A. Remove Lock Latch - Engines without S.B.78-3852

(1) Equipment required:

UT1134 Translating Cowl Unlocking Tool
UT944/2 Translating Cowl Unlocking Tool

(2) Manually cycle thrust reverser to reverse thrust position (Ref.78-30-00, Adjustment/Test).

(3) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN THE REVERSE THRUST POSITION (REF.78-30-00, SERVICING) WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref.78-30-00, Servicing).

(4) Fit appropriate lock-release tool:

(a) R.H. gearbox, Tool UT.1134.

(b) L.H. gearbox, Tool UT944/2.

(5) Remove gearbox (Ref.78-31-17).

(6) Refer to fig.402, remove bolt (1) securing locking plate (2) and remove locking plate.

(7) Remove bolts (3), spring (4) and lock latch (5).

B. Install Lock Latches - Engines without S.B.78-3852

(1) Ensure thrust reverser is locked and systems deactivated and tagged as detailed in operation 2.A.(3).

(2) Refer to fig.402, install latch (5), spring (4) and secure with bolt (3).

(3) Fit locking plate (2) over bolt (3); and secure locking plate with bolt (1).

(4) Install gearbox (Ref.78-31-17).

(5) Unlock and reactivate thrust reverser and associated systems (Ref.78-30-00, Servicing).

(6) Manually cycle thrust reverser to forward thrust position (Ref.78-30-00, Adjustment/Test).

(7) Ensure the locks are fully engaged by checking that the lock indicator rod is retracted and flush with the firewall capping.

C. Remove Lock Latches - Engines with S.B.78-3852

(1) Equipment required:

UT1134 Translating Cowl Unlocking Tool
UT944/2 Translating Cowl Unlocking Tool

(2) Manually cycle thrust reverser to thrust reverse position (Ref.78-30-00, Adjustment/Test)/

(3) WARNING: ENSURE THE THRUST REVERSER SYSTEM IS LOCKED IN THE REVERSE THRUST POSITION (REF.78-30-00, SERVICING) WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems and fit thrust reverser locks (Ref.78-00-00, Servicing).

(4) Fit unlocking tool UT1134 to secondary lock ram and lock tool in unlock position for L.H. latch removal or fit unlocking tool UT944/2 to lock sequencing valve and lock tool in unlock position for R.H. latch removal.

(5) Refer to fig.403, unscrew bolt (1) sufficiently to allow locking plate (2) to be moved clear of bolt (3).

(6) Remove bolt (3), spring (4) and lock latch (5).

D. Install Lock Latches - Engines with S.B.78-3852

(1) Ensure thrust reverser is locked and systems deactivated and tagged as detailed in operation 2.C.(3).

(2) Refer to fig.403, install lock latch (5), spring (4) and secure with bolt (3) fit locking plate (2) over bolt (3) and secure plate with bolt (1).

(3) Release unlocking tool and check that lock latch (5) engages lock yoke (6) then remove tool.

(4) Unlock and reactivate thrust reverser and associated systems (Ref.78-30-00, Servicing).

(5) Manually cycle thrust reverser to the forward thrust position (Ref.78-30-00, Adjustment/Test).

(6) Ensure the locks are fully engaged by checking that the lock indicator rod is retracted and flush with the firewall capping.

3. Removal/Installation Mechanical Drive Lock Probe

Service Bulletin referred to:

S.B.78-3853 - Translating Cowl Locking Mechanism - Strenghtened Latch and Probe with Improved Attachment Features.

Illustrated Parts Catalogue references:

The I.P.C. section where parts disturbed during the following operations can be located is as follows:

78-31-36 Translating Cowl Locking Mechanism Thrust Reverser Mounted.

Removal/Installation of the left and right-hand mechanical drive lock probes is identical but opposite handed. Therefore, the following procedure applies to either.

A. Remove Mechanical Drive Lock Probe - Engines without S.B.78-3853

(1) WARNING: ENSURE THRUST REVERSER AND ASSOCIATED SYSTEMS ARE DEACTIVATED AND TAGGED WHILE WORK IS IN PROGRESS.
Manually cycle thrust reverser to mid position (Ref. 78-30-00, Adjustment/Test).

(2) Refer to fig.404, remove nut (1) then withdraw mechanical drive lock probe (4) from mechanical drive housing and remove washer (2) from probe.

B. Install Mechanical Drive Lock Probe - Engines without S.B.78-3853

(1) Ensure thrust reverser and associated systems are deactivated and tagged and positioned as detailed in operation 3.A.(1).

(2) Refer to fig.404, slide washer (2) over mechanical drive lock probe threaded end then insert lock probe threaded end in its mechanical drive housing location with lock probe striker pointing forward. Align lock probe and washer flats with mechanical drive housing flat then fit nut (1) and fully tighten.

(3) Manually cycle thrust reverser to forward thrust position (Ref.78-30-00, Adjustment/Test).

(4) Reactivate thrust reverser and associated systems (Ref.78-30-00, Servicing).

(5) Ensure the locks are fully engaged by checking that the lock indicator rod is retracted and flush with the firewall capping.

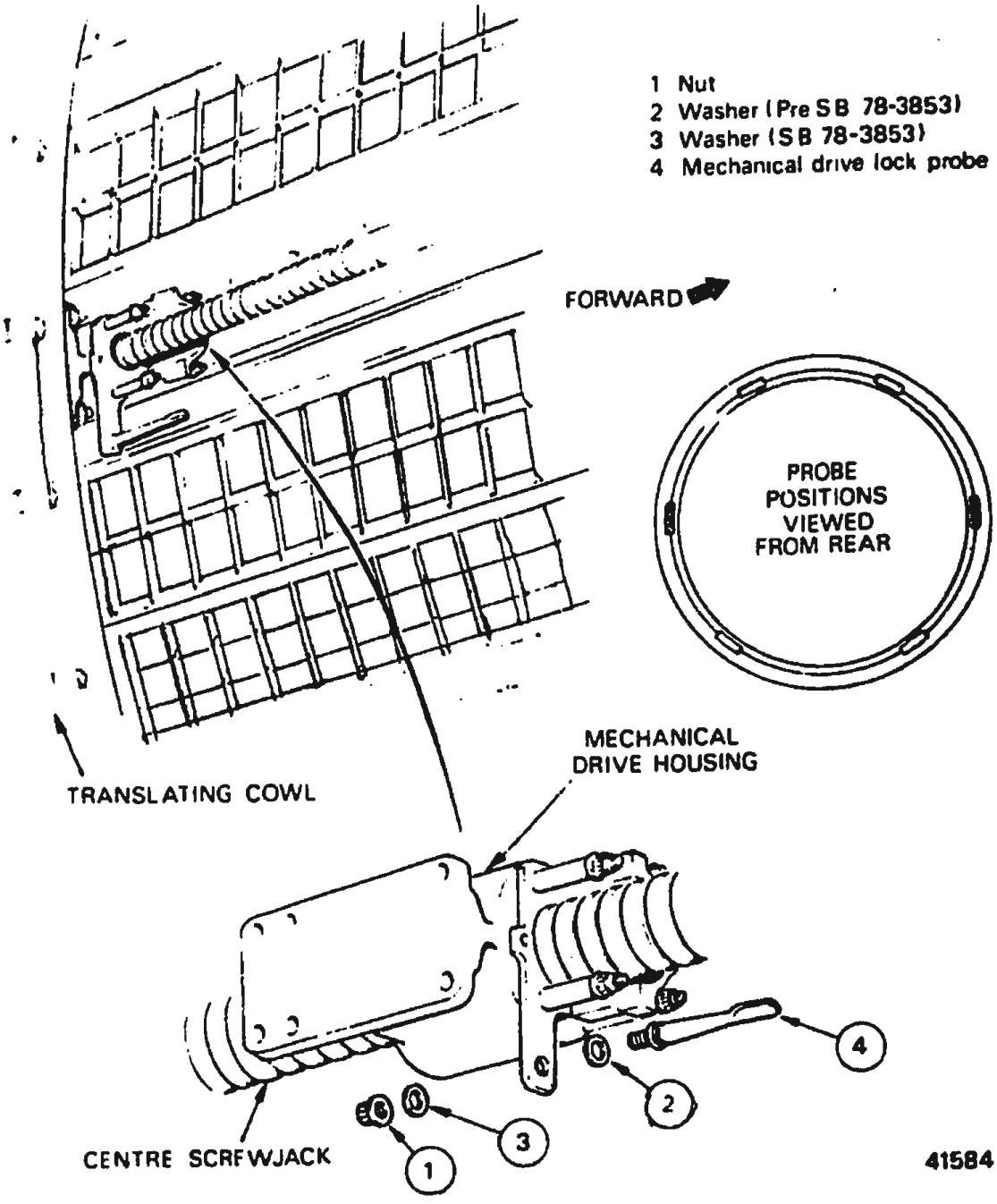
C. Remove Mechanical Drive Lock Probe - Engines with S.B.78-3853

(1) WARNING: ENSURE THRUST REVERSER AND ASSOCIATED SYSTEMS ARE DEACTIVATED AND TAGGED WHILE WORK IS IN PROGRESS.
Manually cycle thrust reverser to mid position (Ref. 78-30-00, Adjustment/Test).

(2) Refer to fig.404, remove nut (1), washer (3) and withdraw mechanical drive lock probe from mechanical drive housing.

D. Install Mechanical Drive Lock Probe - Engines with S.B.78-3853

(1) Ensure thrust reverser and associated systems are deactivated and tagged and positioned as detailed in operation 3.C.(1).



Mechanical drive lock probe - Removal/Installation
Fig.404

(2) Refer to fig.404, with the lock probe striker pointing forward, insert mechanical drive lock probe threaded end in its mechanical drive housing location. Align lock probe flat with mechanical drive housing flat, fit washer (3) then fit nut (1) and fully tighten.

(3) Manually cycle thrust reverser to forward thrust position (Ref.78-30-00, Adjustment/Test).

(4) Reactivate thrust reverser and associated systems (Ref.78-30-00, Servicing).

(5) Ensure the locks are fully engaged by checking that the lock indicator rod is retracted and flush with the firewall capping.

PROXIMITY SWITCH SENSOR - MAINTENANCE PRACTICES

R Service Bulletins referred to:
R S.B.71-3632-Revised Thrust Reverser Secondary Lock Ram Support
R Bracket and Repositioned Electrical Receptacle
R S.B.78-4805-Improved Secondary Lock Sensor Setting Facility.

1. Removal/Installation Proximity Switch Sensor

R Engines not incorporating S.B.78-4805

A. Remove Proximity Switch Sensor

(1) Tag throttle lever, reverse thrust lever and APU/GND AIR REVERSER switches.

(2) Open and tag appropriate THRUST REVERSE circuit breaker on pilot's overhead circuit breaker panel CB1, zone 210.

(3) Open and tag appropriate START AIR VALVE circuit breaker on flight engineer/second officer's aft circuit breaker panel CB3, zone 215.

(4) Tag appropriate ENGINE START panel switchlights.

(5) Open L.H. hinged cowl, 413A or 423A for engine No.1 or 3 (Ref. 71-11-00, Servicing), or L.H. upper hinged cowl, 433DL for engine No.2 (Ref. 71-12-05, Servicing).

R (6) Engines not incorporating S.B.71-3632 refer to fig.201.
R Engines incorporating S.B.71-3632 refer to fig.202.

R (7) Disconnect electrical connector (1).

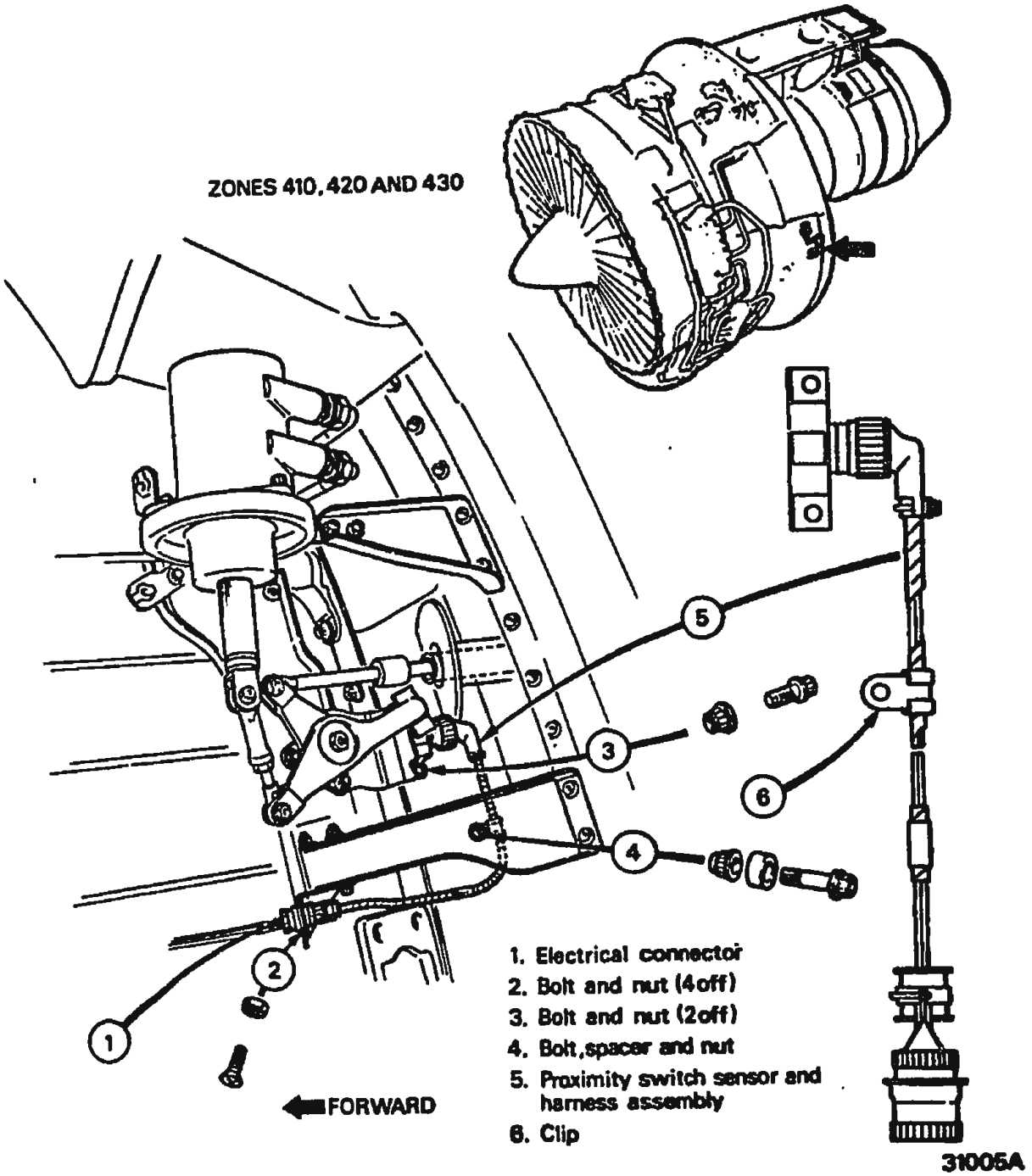
R (8) Remove bolts and nuts (2).

R (9) Engines not incorporating S.B.71-3632 remove bolt,
R spacer and nut (4).
R Engines incorporating S.B.71-3632 remove bolt (4)

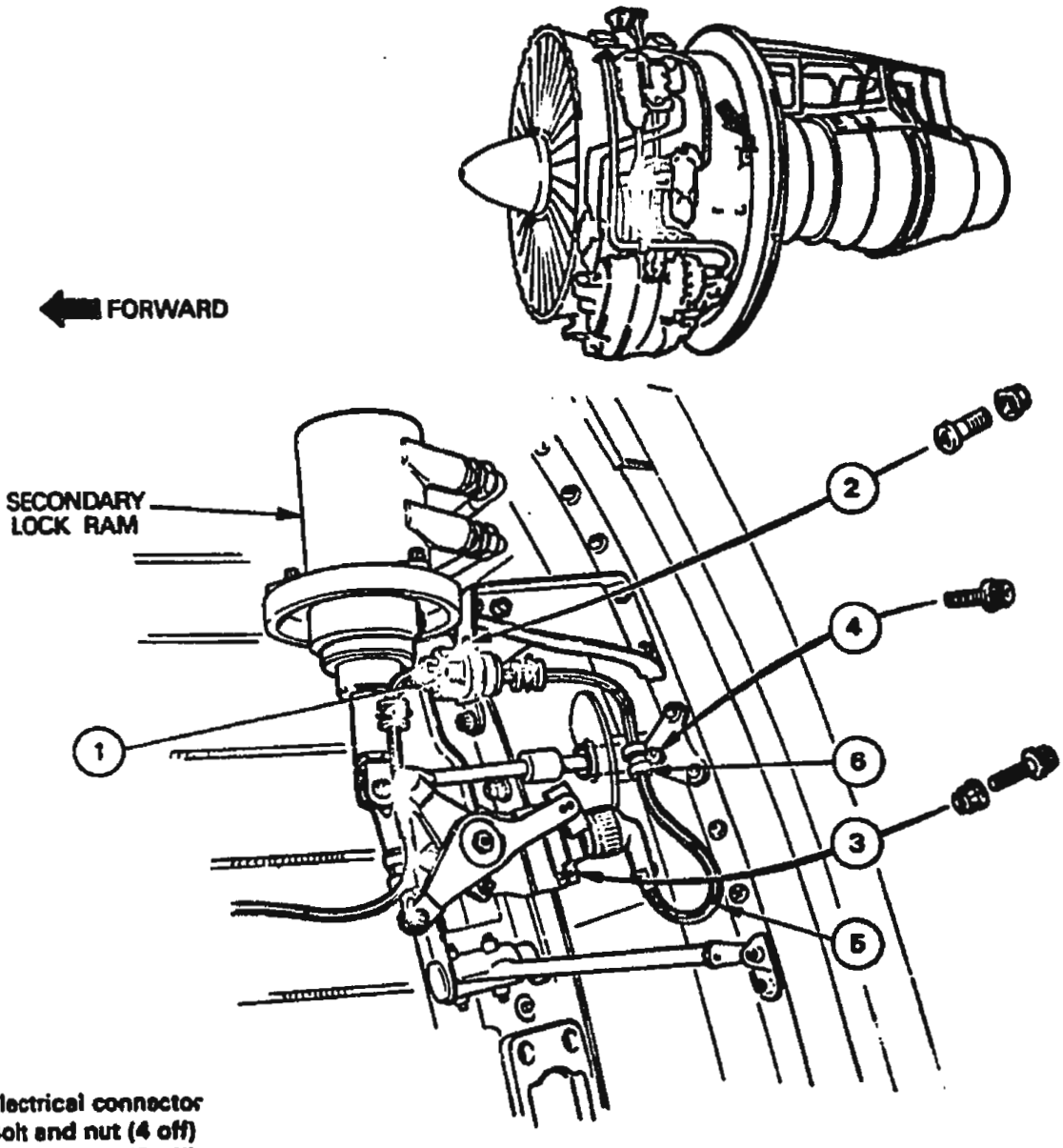
R (10) Remove bolts and nuts (3), then withdraw proximity
R switch sensor and harness assembly (5).

R (11) Remove clip (6) and retain for installation.

R (12) Fit approved blanks to electrical connectors.



R Proximity switch sensor and harness assembly
R removal/installation (Pre-S.B.71-3632 and pre-S.B.78-4805)
R Fig.201



1. Electrical connector
2. Bolt and nut (4 off)
3. Bolt and nut (2 off)
4. Bolt
5. Proximity switch sensor and harness assembly
6. Clip

36143A

R Proximity switch sensor and harness assembly
R removal/installation (S.B.71-3632 and pre-S.B.78-4805)
R Fig.202

R EFFECTIVITY: ALL

R

050B 1A

B. Install Proximity Switch Sensor

(1) Ensure circuit breakers are open and systems tagged as detailed in operations A.(1) through (4).

(2) Remove blanks from electrical connectors.

(3) Engines not incorporating S.B.71-3632 refer to fig.201. Engines incorporating S.B.71-3632 refer to fig.202.

(4) Position clip (6) on new harness assembly.

(5) Position proximity sensor and harness assembly (5) on mounting bracket and fit and secure bolts and nuts (3).

(6) Fit and secure bolts and nuts (2).

(7) Engines not incorporating S.B.71-3632, fit and secure bolt, spacer and nut (4) interposing clip (6) between spacer and nut.

Engines incorporating S.B.71-3632 fit and secure clip (6) with bolt (4).

(8) Connect, secure and wirelock electrical connector (1).

R (9) Close L.H. hinged cowl, 413A or 423A for engine No.1 or 3 (Ref. 71-11-00, Servicing), or L.H. upper hinged cowl, 433DL for engine No.2 (Ref. 71-12-05, Servicing).

R (10) Remove tags and close circuit breakers opened in operation A.(1) through (4).

R 2. Removal/Installation Proximity Switch Sensor -

R Engines incorporating S.B.78-4805

R A. Remove Proximity Switch Sensor

R (1) Tag throttle lever, reverse thrust lever and APU/GND
R AIR REVERSER switches.

R (2) Open and tag appropriate THRUST REVERSE circuit breaker
R on pilot's overhead circuit breaker panel CB1, zone 210.

R (3) Open and tag appropriate START AIR VALVE circuit
R breaker on flight engineer/second officer's aft circuit
R breaker panel CB3, zone 215.

R (4) Tag appropriate ENGINE START panel switchlights.

R (5) Open L.H. hinged cowl, 413A or 423A for engine No.1 or
R 3 (Ref.71-11-00, Servicing), or L.H. upper hinged cowl,
R 433DL for engine No.2 (Ref.71-12-05, Servicing).

R (6) Engines not incorporating S.B.71-3632 refer to fig.203.

R Engines incorporating S.B.71-3632 refer to fig.204.

R (7) Disconnect electrical connector (1).

R (8) Remove bolts and nuts (2).

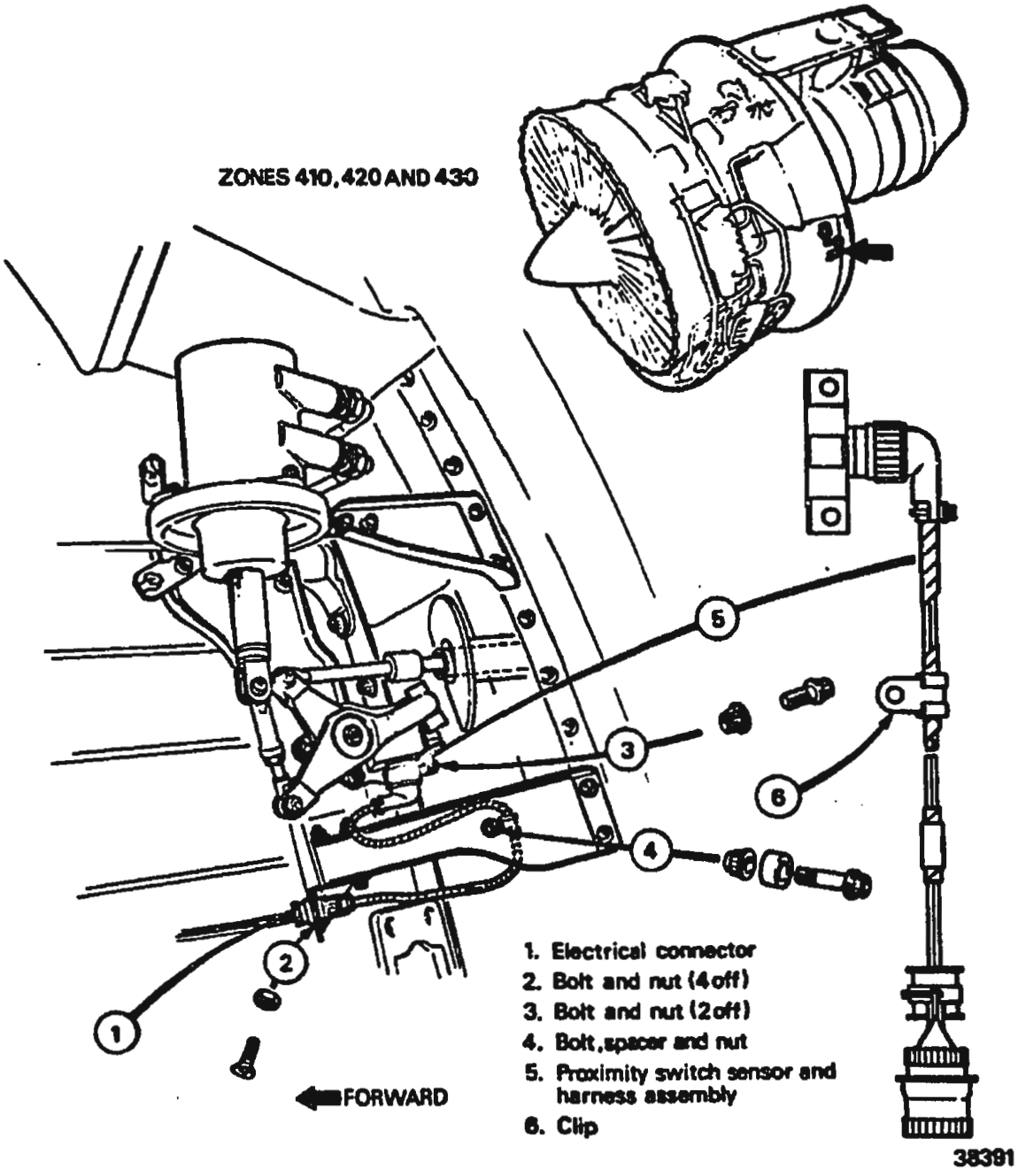
R (9) Engines not incorporating S.B.71-3632 remove bolt,
R spacer and nut (4).

R Engines incorporating S.B.71-3632 remove bolt (4)

R (10) Remove bolts and nuts (3), then withdraw proximity
R switch sensor and harness assembly (5).

R (11) Remove clip (6) and retain for installation.

R (12) Fit approved blanks to electrical connectors.



R Proximity switch sensor and harness assembly
R removal/installation (S.B.78-4805 and pre-S.B.71-3632)
R Fig.203

B. Install Proximity Switch Sensor

(1) Ensure circuit breakers are open and systems tagged as detailed in operation A.(1) through (4).

(2) Remove blanks from electrical connectors.

(3) Engines not incorporating S.B.71-3632 refer to fig.203.

Engines incorporating S.B.71-3632 refer to fig.204.

(4) Position clip (6) on new harness assembly.

(5) Position proxoimity sensor and harness assembly (5) on mounting bracket and fit and secure bolts and nuts (3).

(6) Fit and secure bolts and nuts (2).

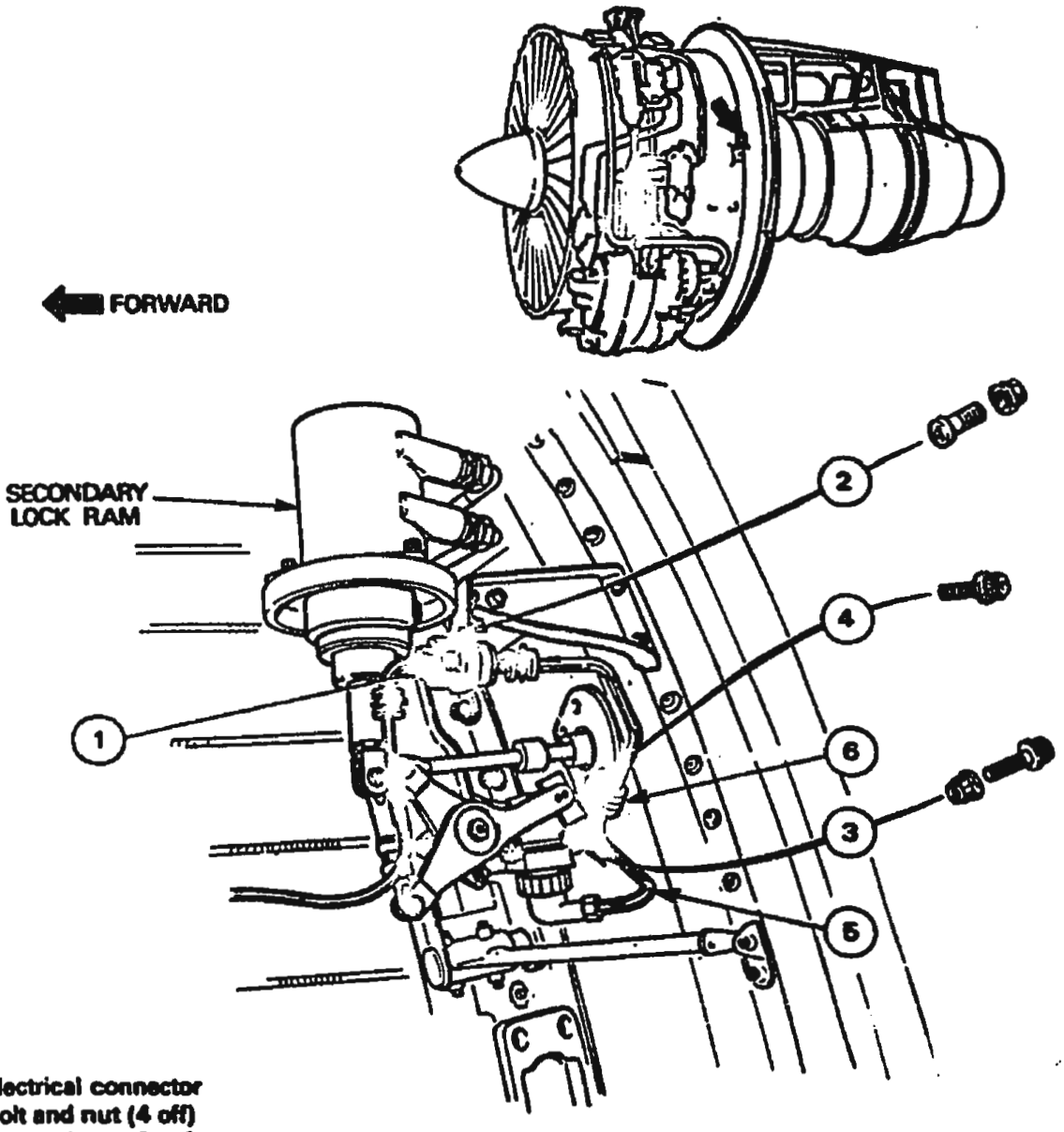
(7) Engines not incorporating S.B.71-3632, fit and secure bolt, spacer and nut (4) interposing clip (6) between spacer and nut.

Engines incorporating S.B.71-3632 fit and secure clip (6) with bolt (4).

(8) Connect, secure and wirelock electrical connector (1).

R (9) Close L.H. hinged cowl, 413A or 423A for engine No.1 or 3 (Ref.71-11-00, Servicing) or L.H. upper hinged cowl, 433DL for engine No.2 (Ref.71-12-05, Servicing).

R (10) Remove tags and close circuit breakers opened in operations A.(1) through (4).



1. Electrical connector
2. Bolt and nut (4 off)
3. Bolt and nut (2 off)
4. Bolt
5. Proximity switch sensor and harness assembly
6. Clip

38392

R Proximity switch sensor and harness assembly
R removal/installation (S.B.78-4805 and S.B.71-3632)
R Fig.204

R EFFECTIVITY: ALL

REVERSE THRUST PRESSURE SWITCH - MAINTENANCE PRACTICES

CAUTION: THE REVERSE THRUST PRESSURE SWITCH COMPRISES A PRESSURE SWITCH/PROXIMITY SENSOR AND HARNESS AS ONE ASSEMBLY THAT MUST BE CHANGED AS AN ASSEMBLY.

1. Removal/Installation Pressure Switch/Proximity Sensor and Harness Assembly

Referenced Procedures:

R	24-00-00	Electrical Power - Maintenance Practices
	70-51-00	Torque Tightening Technique
	71-00-00	Power Plant - Adjustment/Test
	71-11-00	Cowling, Engines No.1 or No.3 - Servicing
	71-12-05	L.H. and R.H. Upper Hinged Cowl - Servicing

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

78-31-05	Thrust Reverser Mounted Air Tubes
78-31-38	Thrust Reverser Pressure Switch Installation

A. Remove Pressure Switch/Proximity Sensor and Harness Assembly.

(1) Tag engine throttle lever, reverse thrust lever and APU/GND AIR TO REVERSER switches.

(2) Open and tag appropriate THRUST REVERSE circuit breaker on pilot's overhead circuit breaker panel CB1, zone 210.

(3) Open and tag appropriate START AIR VALVE circuit breaker on flight engineer/second officer's aft circuit breaker panel CB3, zone 215.

(4) Tag appropriate ENGINE START panel switchlights.

(5) Open L.H. hinged cowl, 413A or 423A for engine No.1 and 3 (Ref. 71-11-00), or L.H. upper hinged cowl, 433DL for engine No.2 (Ref. 71-12-05).

(6) Refer to fig.201, disconnect electrical connector (1).

(7) Remove screws and bolts (2).

(8) Disconnect connector (3).

(9) Remove bolt (4) and release sensor harness from harness clip.

(10) Remove bolts, washers and nuts (5) and remove pressure switch (6) leaving air tube clipping bracket (7) in position.

(11) Fit approved blanks to all exposed apertures and connectors

B. Install Pressure Switch

(1) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Lockwire	DTD.189A 22 S.W.G.	- 21 A.W.G.	238

(2) Ensure circuit breakers are open and systems tagged as detailed in operation A.(1) through (4).

(3) Remove blanks from apertures and connectors.

(4) Refer to fig.201, position pressure switch (6) on mounting bracket. Fit and secure bolts, washers and nuts (5) interposing air tube clipping bracket (7) between nut and rear face of pressure switch mounting bracket.

R (5) Position electrical receptacle in lower hole in mounting bracket and fit and secure screws and nuts (2).

R (6) Position sensor harness in harness clip and fit and secure bolt (4).

R (7) Connect and secure electrical connector (1).

R (8) Perform pressure switch functional check as follows:

R (a) Connect a regulated clean air supply to pressure
R switch connector (3).

R (b) Ensure REV IND circuit breaker on panel CB3,
R zone 215 is closed for appropriate engine.

R (c) Provide electrical power (Ref. 24-00-00,
R Maintenance Practices).

R (d) Check that REVERSER OPERATING light, zone 210 is
R extinguished.

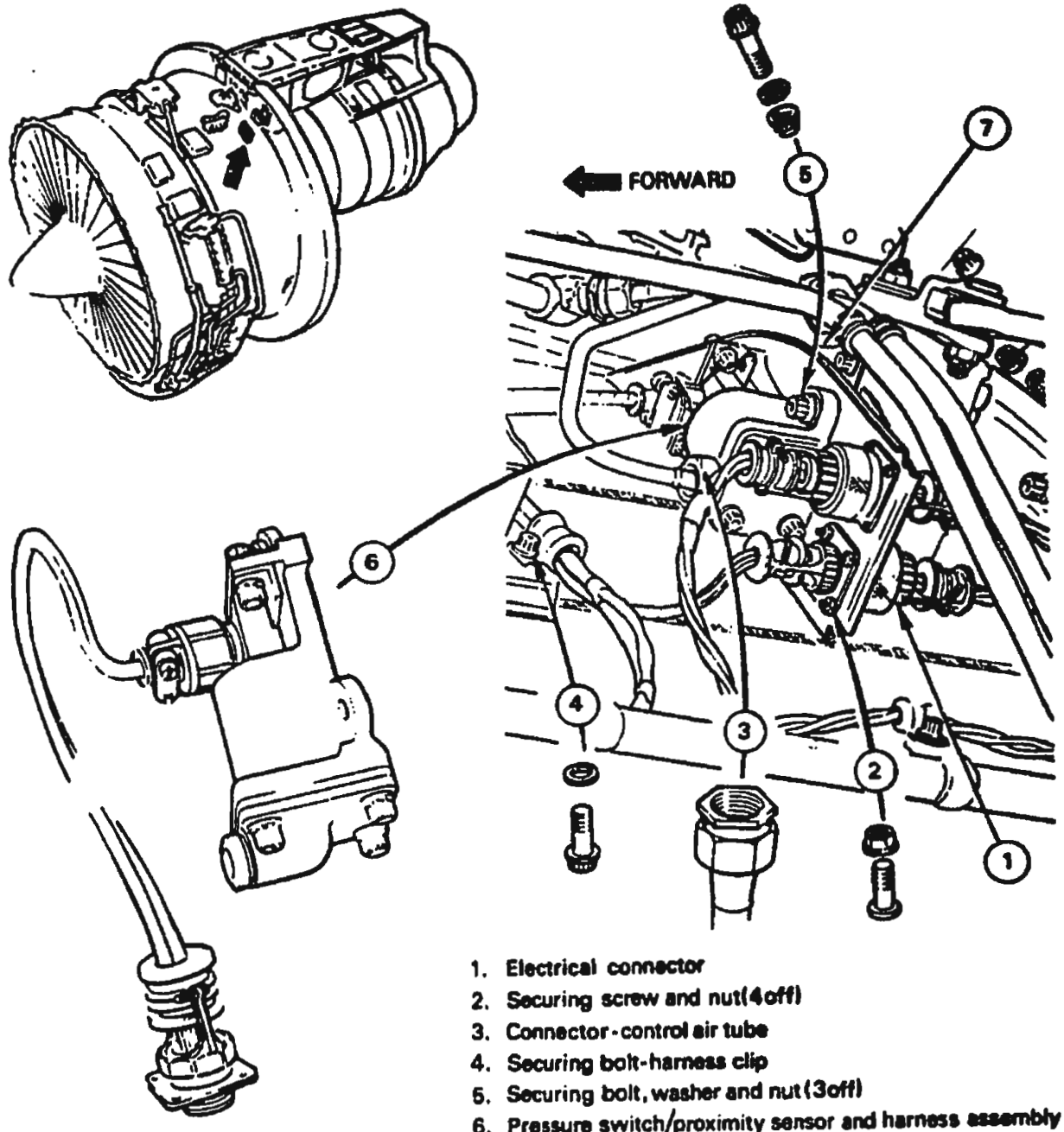
R (e) Apply air pressure of between 15-30 p.s.i.g. to
R pressure switch and check that REVERSER OPERATING
R light is illuminated.

R (f) Turn off and disconnect air supply and ensure
R REVERSER OPERATING light is extinguished.

R (9) Connect and secure (Ref. 70-51-00) connector (3) and
R wirelock.

R (10) Remove tags and close circuit breakers opened in operation A.(1) through (4).

R (11) Close L.H. hinged cowl, 413A or 423A for engine No.1 and 3 (Ref. 71-11-00), or L.H. upper hinged cowl, 433DL for engine No.2 (Ref. 71-12-05).



1. Electrical connector
2. Securing screw and nut(4off)
3. Connector-control air tube
4. Securing bolt-harness clip
5. Securing bolt, washer and nut(3off)
6. Pressure switch/proximity sensor and harness assembly
7. Air tube clipping bracket

35828

R Pressure switch proximity sensor and harness assembly
R removal/installation
R Fig.201

HIGH PRESSURE VALVE DEACTIVATION VALVE (THRUST REVERSER) - MAINTENANCE PRACTICES

1. Removal/Installation Deactivation Valve

Service Bulltins refered to:

S.B.71-3414 Inverted High Pressure Valve Deactivation Valve

Referenced Procedures

71-11-00 Cowlings, Engines No.1 and No.3 - Servicing
71-12-01 LH and RH Lower Hinged Cowl - Servicing
78-30-00 Thrust Reverser - Servicing

Illustrated Parts Catalogue References

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

36-11-38 Mid Stage to High Pressure Valve Air Tubes
78-31-42 Thrust Reverser Deactivation Valve

A. Remove deactivation valve

(1) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN THE FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00).

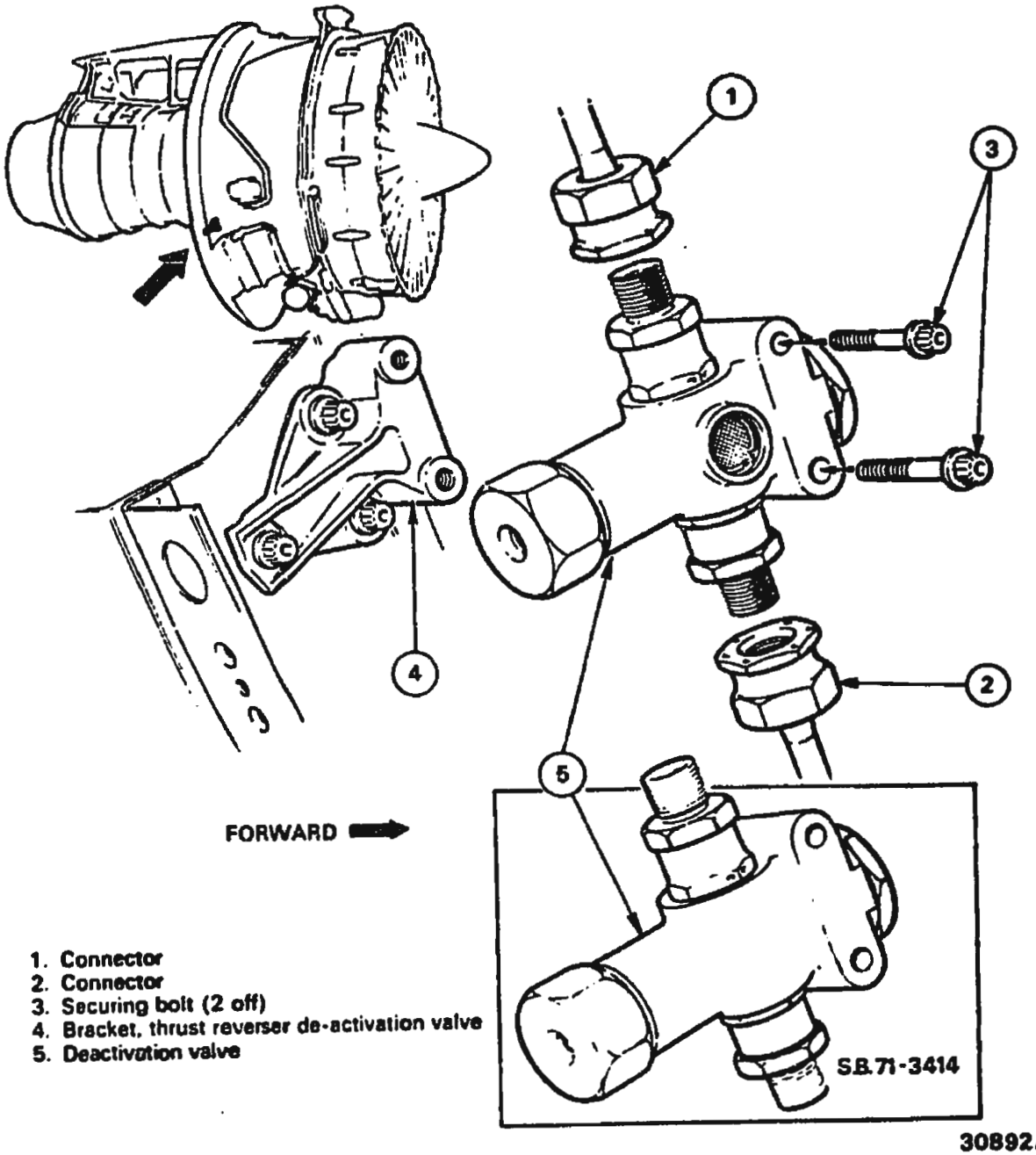
(2) Open R.H. hinged cowl, 414A or 424A for engines No.1 and 3 (Ref. 71-11-00) or 434AR for engine No.2 (Ref. 71-12-01).

(3) Refer to fig.201, disconnect connector (1) and (2).

(4) Support valve (5) and remove bolts (3).

(5) Remove valve (5) from bracket (4).

(6) Fit approved blanks to all exposed apertures and connectors.



1. Connector
2. Connector
3. Securing bolt (2 off)
4. Bracket, thrust reverser de-activation valve
5. Deactivation valve

Deactivation valve removal/installation
Fig.201

B. Install deactivation valve

(1) Materials required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Stainless steel locking wire	DTD.189A 22 S.W.G.	21 A.W.G.	238

(2) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation A.(1).

(3) Remove blanks from all apertures and connectors.

(4) Refer to fig.201, on engines not incorporating S.B.71-3414, position valve (5) on bracket (4) with wire gauze vent facing forward.

On engine incorporating S.B.71-3414, position valve on bracket with wire gauze vent facing rearward.

(5) Fit bolts (3) and secure.

(6) Connect and secure (Ref. 70-51-00, para.10) connectors (1) and (2) and wirelock.

(7) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00).

(8) Close R.H. hinged cowl, 414A or 424A for engine No.1 and 3 (Ref. 71-11-00) or 434AR for engine No.2 (Ref. 71-12-01).

SECONDARY LOCK RAM - MAINTENANCE PRACTICES

1. Removal/Installation Secondary Lock Ram

Referenced Procedures:

70-51-00	Torque Tightening Techniques
71-11-00	Cowlings, Engine No.1 and 3 - Servicing
71-12-05	L.H. Upper Hinged Cowl, Engine No.2 - Servicing
78-30-00	Thrust Reverser - Adjustment/Test
78-30-00	Thrust Reverser - Servicing

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

78-31-05	Engine Mounted Air Tubes
78-31-41	Translating Cowl Locking Mechanism
78-31-43	Secondary Lock Ram Installation

A. Remove Secondary Lock Ram

(1) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00, Servicing).

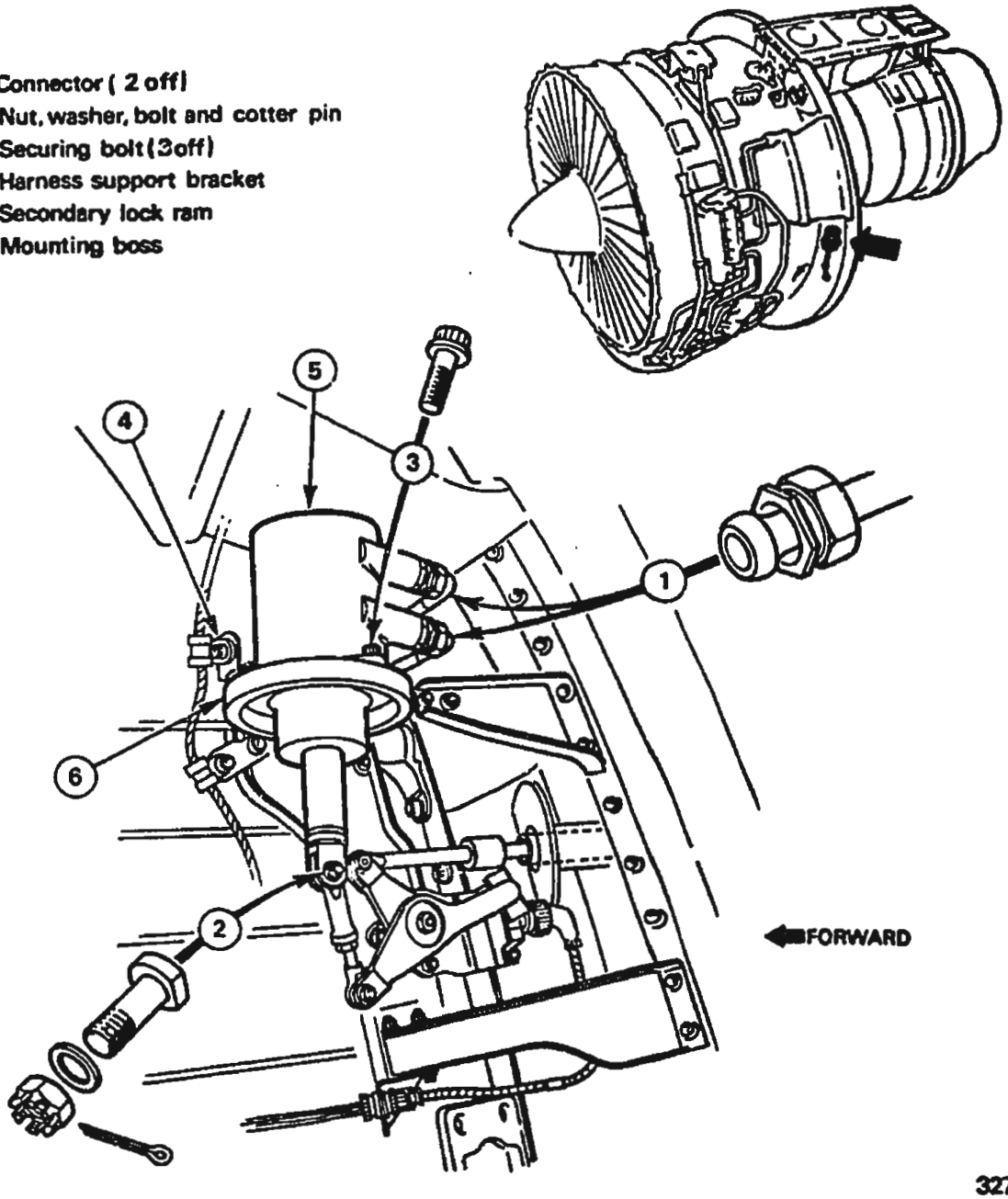
(2) Open L.H. hinged cowl 413A or 423A for engine No.1 or 3 (Ref. 71-11-00) or L.H. upper hinged cowl, 433 DL for engine No.2 (Ref. 71-12-05).

(3) Refer to fig.201, disconnect connectors (1).

(4) Remove nut, washer and bolt (2)

(5) Remove bolts (3), leaving bracket (4) attached to electrical harness and remove secondary lock ram (5).

1. Connector (2 off)
2. Nut, washer, bolt and cotter pin
3. Securing bolt (3off)
4. Harness support bracket
5. Secondary lock ram
6. Mounting boss



Secondary lock ram disconnect points
Fig.201

(6) Fit approved blanks to all connectors and exposed apertures.

B. Install Secondary Lock Ram

(1) Material required

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Lockwire	DTD.189A	-	238
	22 S.W.G.	-	-
	-	21 A.W.G.	-

(2) Ensure thrust reverser is locked and systems deactivated and tagged as detailed in operation A.(1).

(3) Remove blanks from all connectors and apertures.

(4) Refer to fig.201, position secondary lock ram (5) on mounting boss (6). Position bracket (4) on lock ram and then secure secondary lock ram to the mounting boss with bolts (3).

(5) Connect and secure (Ref. 70-51-00) connectors (1) and wirelock.

(6) Fit and tighten nut, washer, bolt and secure with new cotter pin (2).

(7) Set translating cowl left-hand lock mechanism (Ref. 78-30-00, Adjustment/Test).

(8) Close L.H. hinged cowl 413A or 423A for engine No.1 or 3 (Ref. 71-11-00), or L.H. upper hinged cowl 433 DL for engine No.2 (Ref. 71-12-05).

(9) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

(10) Before next flight, functionally test thrust reverser system (Ref. 78-30-00, Adjustment/Test).

THRUST REVERSER DEACTIVATION VALVE AND FITTINGS - MAINTENANCE PRACTICES

1. Removal/Installation Deactivation Valve S.B.78-3571 and Garrett AiResearch S.B.898330-78-1165

Service Bulletins referred to:

S.B.78-3551 - Introduction of 15 Degree Afterbody and Exhaust Collector
S.B.78-3571 - Introduction of Pressure Regulator with Remote Deactivation
Garrett AiResearch S.B.898330-78-1165 - Incorporate Fitting with Additional Outlet

Referenced Procedures:

70-02-01	Identification, Lubrication and Fitting of Rubber Sealing Rings
70-51-00	Torque Tightening Techniques
72-03-00	Gas Generator Fairings - Removal/Installation
78-30-00	Thrust Reverser - Servicing

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

78-31-05	Engine Mounted Air Tubes
78-31-44	Thrust Reverser Deactivation Valve

A. Remove Valve

(1) Equipment required:

XUT.42526	Spacer
XUT.42527	Side piece

(2) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00).

(3) Position spacer and side pieces in cold stream duct.

(4) Remove following access panel (Ref. 72-03-00):

Engines No.1 and 3

Pylon fairing L.H. rear access panel (418DL5 or 428DL5)

Engine No.2

Pylon fairing L.H. rear access panel (438DL5)

(5) Refer to fig.201, disconnect connectors (1) and (2).

(6) Remove bolts (3) and remove valve (4) from bracket.

NOTE: On engines incorporating S.B.78-3551 leave bracket (7) attached to lightning conductor.

(7) Place valve on a clean work surface; remove adapters (5) and retain for fitment to new valve.

(8) Remove seal rings (6) from adapters, discard seal rings.

(9) Fit approved blanks to all exposed apertures and connectors.

B. Install Valve

(1) Equipment required:

XUT.42526	Spacer
XUT.42527	Side piece

(2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Lockwire	DTD.189A 22 S.W.G.	- 21 A.W.G.	238

(3) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation A.(2).

(4) Ensure spacer and side pieces are fitted in cold stream duct.

(5) Remove blanks from all apertures and connectors.

(6) Refer to fig.201, fit and lubricate (Ref. 70-02-01) new seal rings (6) to adapters (5).

(7) Fit and secure (Ref. 70-51-00) adapters (5) to valve (4), and wirelock.

(8) Position valve (4) on bracket with wire gauze vent facing rearward and valve outlet uppermost, fit and secure bolts (3).

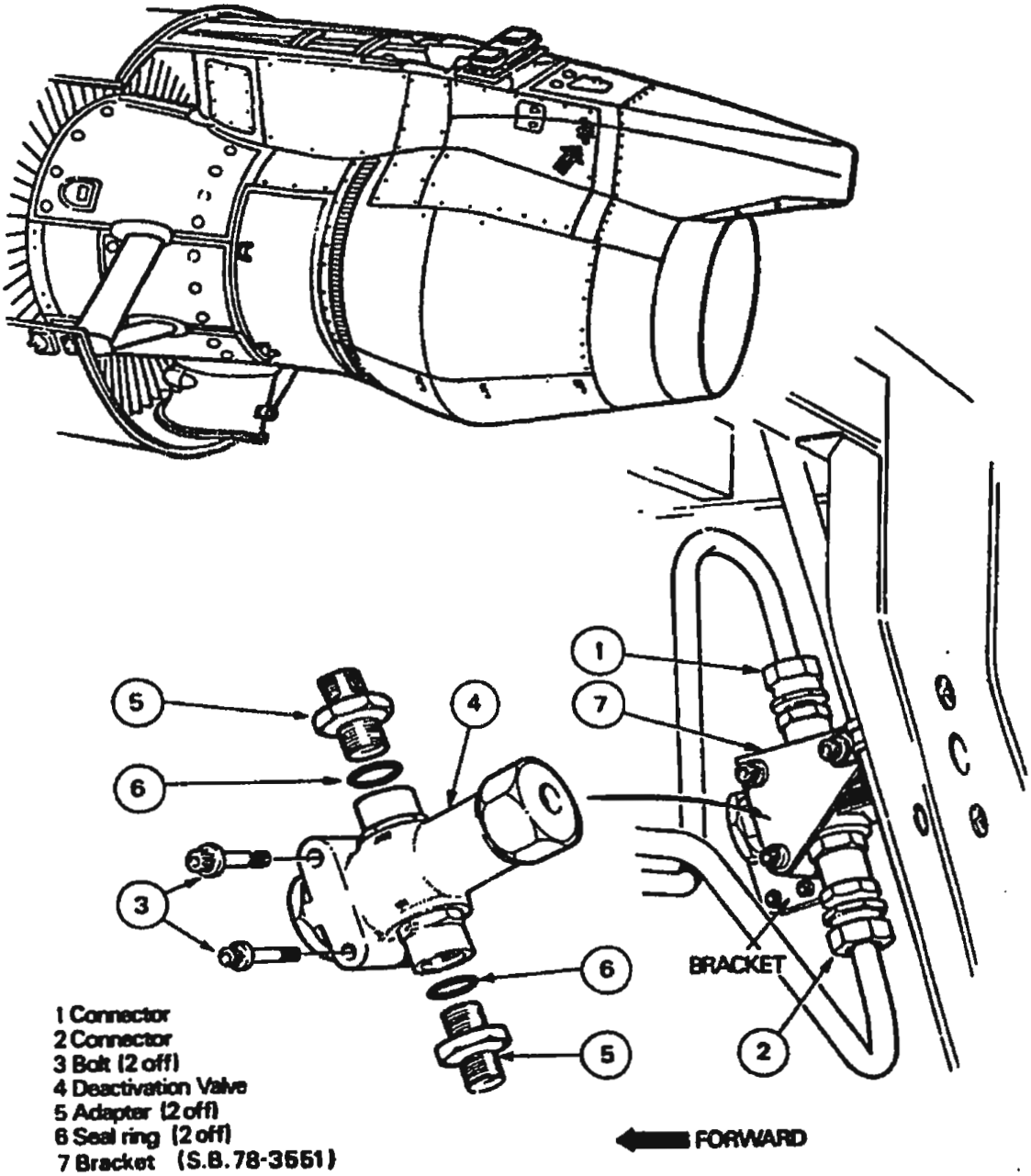
NOTE: On engines incorporating S.B.78-3551 fit lightning conductor bracket (7) and secure both bracket and valve (4) with bolts (3).

(9) Connect and tighten (Ref. 70-51-00) connectors (1) and (2), and wirelock.

(10) Fit pylon fairing L.H. rear access panel (Ref. 72-03-00).

(11) Remove spacer and side pieces from cold stream duct.

(12) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00).



Thrust reverser deactivation valve - removal/installation
Fig.201

EXTEND PROXIMITY SWITCH SENSOR - REMOVAL/INSTALLATION

1. Removal/Installation Extend Proximity Switch Sensor

Referenced Procedures:

72-03-00	Gas Generator Fairings - Removal/Installation
78-30-00	Thrust Reverser - Servicing
78-30-00	Thrust Reverser - Adjustment/Test
78-31-10	Interface Translating Fairing (Engines No.1 and No.3) - Removal/Installation
78-31-11	Interface Translating Fairing (Engine No.2) - Removal/Installation

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

72-03-05	Hoop Plate - Intermediate
78-31-50	Extend Proximity Switch Sensor Installation

A. Remove Sensor

(1) Equipment required:

CP.20309 or XUT.37594	Working platform
or (XUT.42526	Spacer
(XUT.42527	Side piece
ZZL-R-9511-16	Extraction tool

(2) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN FORWARD THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00, Servicing).

(3) Engines No.1 and No.3

(a) Remove R.H. seal assembly (Ref. 78-31-10).

(4) Engine No.2

(a) Remove R.H. interface translating fairing 435AR (Ref. 78-31-11).

(5) Fit working platform in cold stream duct.

(6) Remove R.H. interservices fairing access panel 418BR or 428BR for engines No.1 or 3, or 438BR for engine No.2 (Ref. 72-03-00).

(7) Refer to fig.401 (Sheet 1), disconnect connector and remove securing clip. Retain securing clip for refitment.

(8) Refer to fig.403, remove screws (1) and clamp segments (2).

(9) Move support bushing (3) along harness away from ring clamp (4).

(10) Unscrew ring clamp (4) and move along harness to support bushing.

(11) Using extraction tool from front of plug, push pins (5) out of insert (6).

(12) Remove shell (7), ring clamp (4) and support bushing (3) from harness.

(13) Cut-off pins (5) from their appropriate leads and discard.

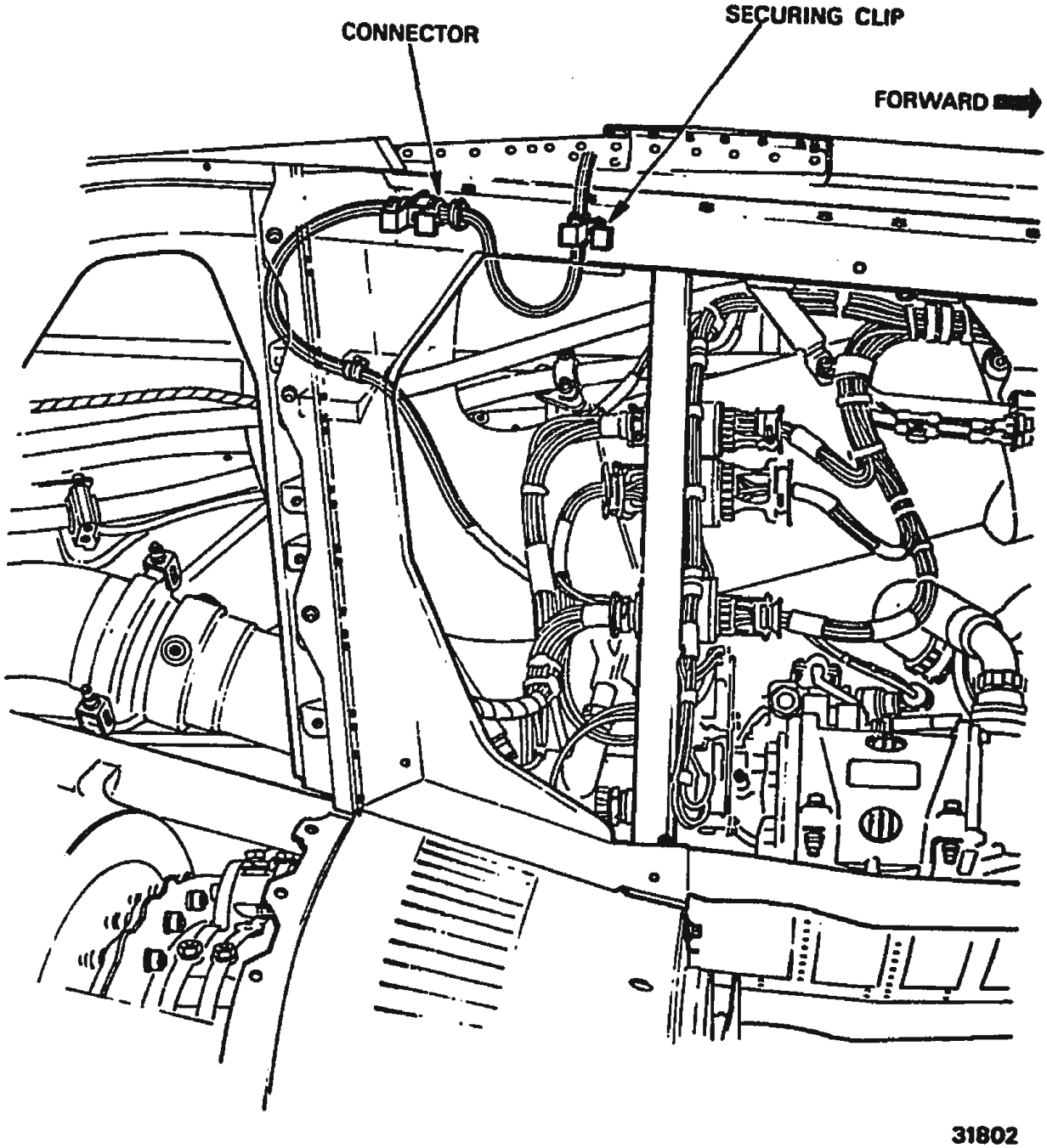
(14) Remove ident sleeves (8), (9), (10), (11), (12) and (13) from harness, and retain for refitment.

(15) Refer to fig.401 (Sheet 2), unscrew coupling nut (1) from connector then remove coupling nut, washer (2) and seal (3) from harness.

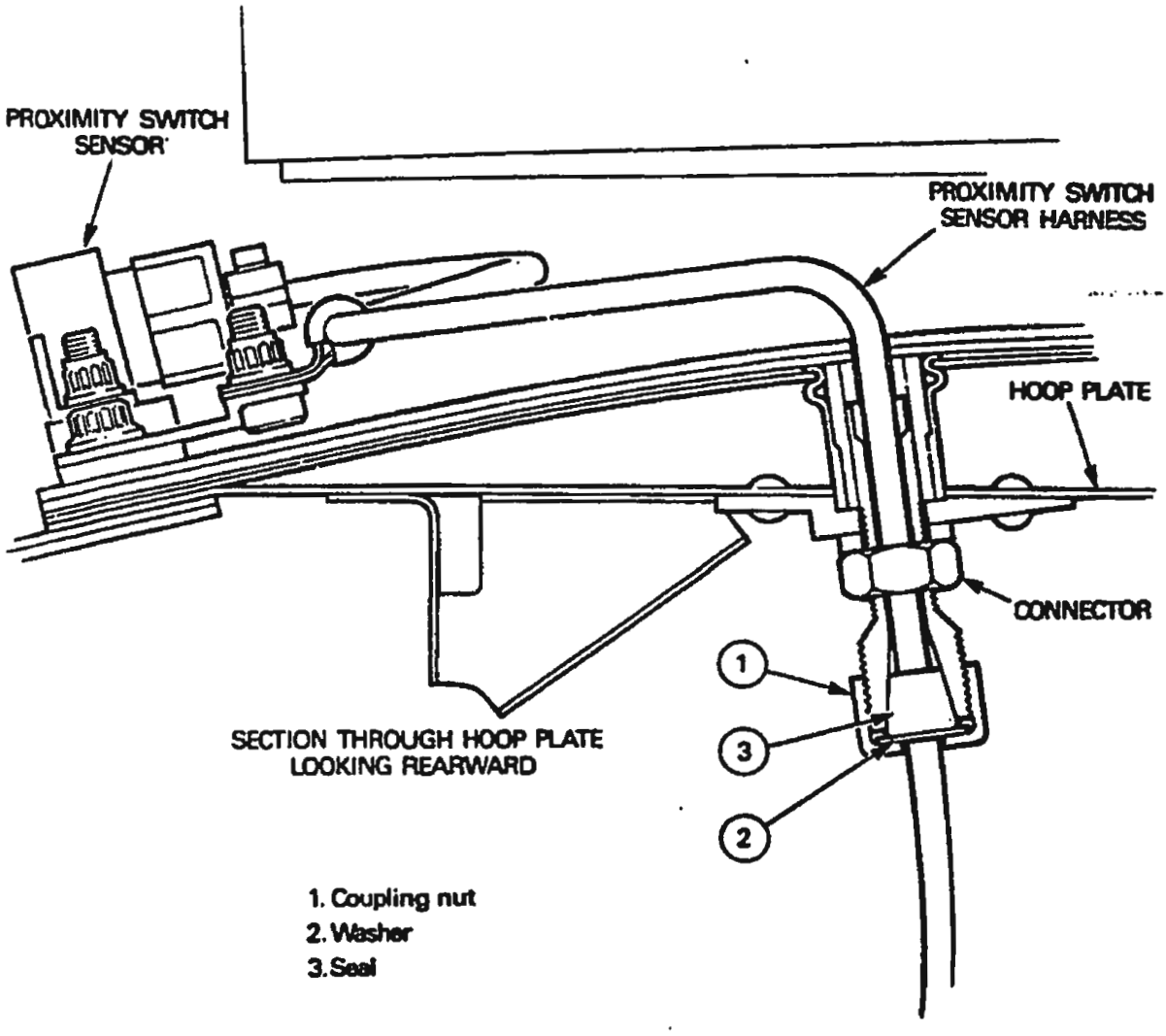
(16) Refer to fig.402, remove nut (1).

NOTE: Dee headed bolt will be retained in position by support bracket.

(17) Remove clip (2) from harness and retain for refitment.



Proximity switch sensor harness disconnect points
Fig.401 (Sheet 1)



Proximity switch sensor harness disconnect points
Fig.401 (Sheet 2)

(18) Remove nuts (3).

NOTE: Dee headed bolts will be retained in position by sensor support bracket.

(19) Carefully pull sensor harness through hoop plate then remove sensor (4) from engine.

NOTE: Before pulling sensor harness through hoop plate, attach a suitable 'pull through' to harness for use on re-installation of the harness. After harness has been pulled through hoop plate, remove 'pull through' from harness and leave in position. Failure to do this may result in the engine having to be removed to install the sensor harness through the hoop plate.

(20) Refer to fig.403, remove ident sleeve (14) and retain for refitment.

B. Install Sensor

(1) Equipment required:

M22520/1-01	Crimping tool
M22520/1-02	Turret
ZZL-R9510-16	Insertion tool
Clean, stiff bristled brush	

(2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Locking compound	Loctite 'CV'	Loctite 'CV'	853
Anti-chafe sleeve (as required)			

(3) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation 1.A.(2).

(4) Ensure working platform is fitted in cold stream duct.

(5) Check length of harness plus sensor, which should be 24.00 to 24.25in. (609,60 to 615,95 mm.) and cut harness to correct length if required.

(6) Bind harness with anti-chafe sleeve, leaving enough uncovered for fitting of plug.

(7) Refer to fig.403, fit ident sleeve (14) to harness and move as near as possible to sensor.

(8) Refer to fig.402, attach 'pull through', positioned in operation 1.A. (19), to sensor harness then carefully pull harness through hoop plate. Position sensor (4) over bolts onto sensor support bracket then remove 'pull through' from harness.

(9) Fit and secure nuts (3).

(10) Fit clip (2) to harness then position clip over bolt onto support bracket.

(11) Fit and secure nut (1).

(12) Refer to fig.401 (Sheet 2), slide seal (3), washer (2) and coupling nut (1) onto harness then position seal and washer on connector and loosely fit coupling nut.

(13) Refer to fig.403, fit ident sleeves (13), (12) and (11) to harness.

NOTE: Ident sleeves must be as near to connector as possible.

(14) Slide support bushing (3) and ring clamp (4) onto harness.

(15) Fit ident sleeves (10), (9) and (8) to their appropriate leads.

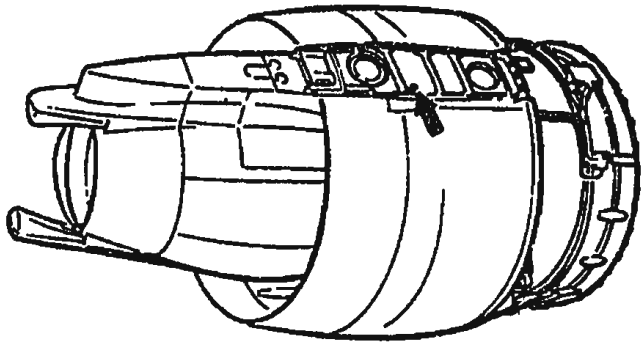
(16) Remove 0.250in. (6,35 mm.) of outer cover from end of each lead.

(17) Fit turret to crimping tool and set to blue position, setting 18.

(18) Insert bared end of lead into well of pin until it bottoms.

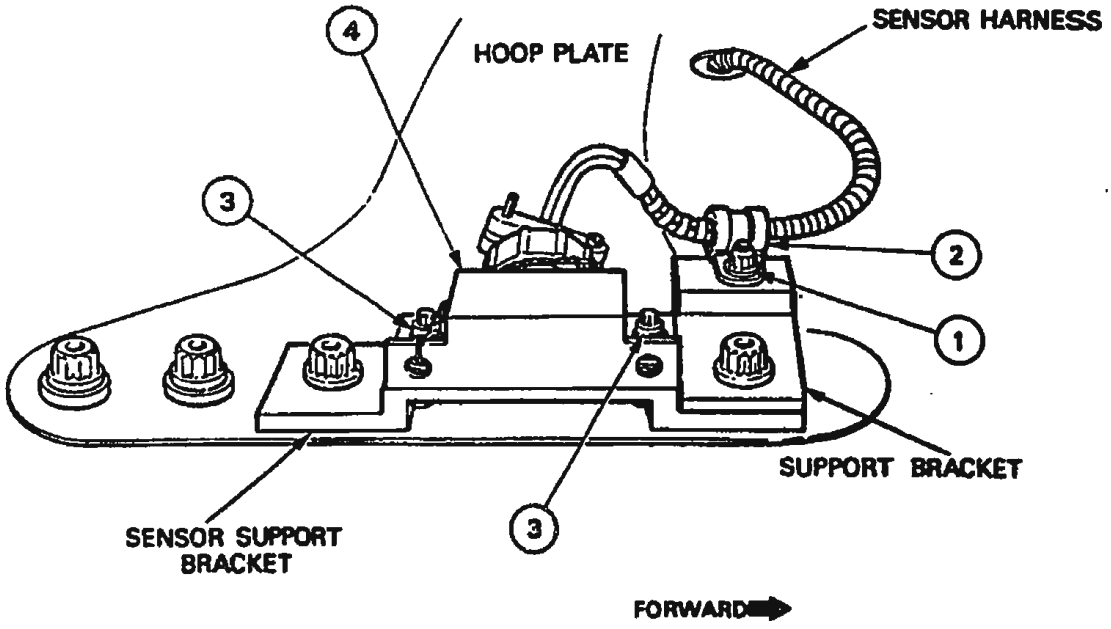
(19) Using crimping tool, crimp pin to lead.

(20) Repeat operations (18) and (19) for other two leads.



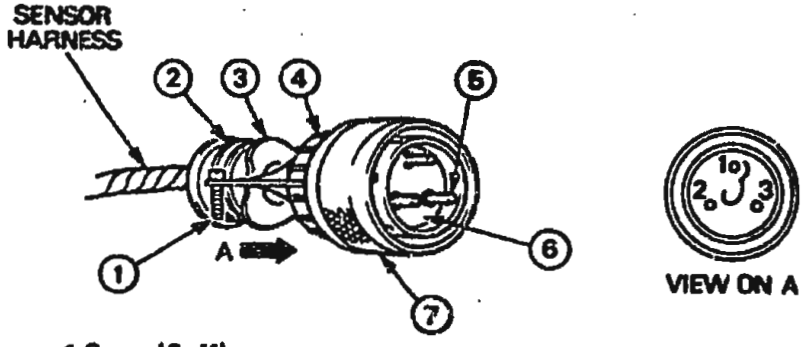
ZONES 410,420 AND 430

1. Nut harness clip
2. Clip
3. Nut (2off) securing sensor
4. Proximity switch sensor

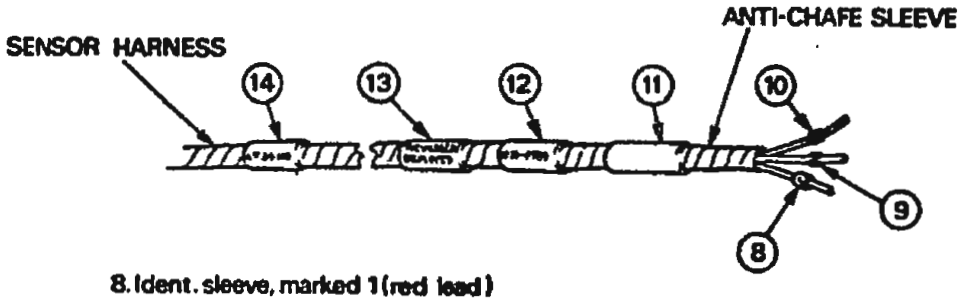


31804A

Proximity switch sensor disconnect points
Fig.402



1. Screw (2 off)
2. Clamp segment (2 off)
3. Support bushing
4. Ring clamp
5. Pin (3 off)
6. Insert
7. Shell



8. Ident. sleeve, marked 1 (red lead)
9. Ident sleeve, marked 2 (blue lead)
10. Ident. sleeve, marked 3 (yellow lead)
11. Ident. sleeve, marked 7831-7008A18 RED
    7831-7009A18 BLU
    7831-7010A18 YEL
12. Ident. sleeve marked 7831-P702
13. Ident. sleeve, marked REVERSER DEPLOYED
14. Ident. sleeve, marked LJ 24110

31805

Sensor harness plug removal/installation
Fig.403

(21) Using insertion tool from rear of plug, fit pins (5) into their respective numbered hole (Ref. A, fig.403) in insert (6). Check retention of pins in insert by gently pulling on appropriate lead.

(22) Screw ring clamp (4) onto shell (7).

(23) Position support bushing (3) then fit clamp segments (2) and secure with screws (1). Ensure support bushing (3) is equally displaced either side of clamp segments (2).

(24) Using a brush, apply locking compound to screws (1).

(25) Check resistance at pins 1 and 3 (27 to 33 ohms) and pins 1 and 2 (330 to 400 ohms).

(26) Refer to fig.401 (Sheet 2), correctly position harness in connector so that there is adequate clearance between harness and aircraft pylon.

(27) Check tighten coupling nut (1) and using a brush, apply locking compound to upper surface of coupling nut and adjacent thread of connector.

(28) CAUTION: ENSURE ELECTRICAL CONNECTOR IS FREE FROM LIQUID AND/OR SOLID CONTAMINATION BEFORE CONNECTING. FAILURE TO DO SO COULD RESULT IN A FIRE.
Refer to fig.401 (Sheet 1), fit and secure connector.

(29) Fit and secure securing clip.

(30) Install R.H. interservices fairing access panel 418BR or 428BR for engines No.1 or 3, or 438BR for engine No.2 (Ref. 72-03-00).

(31) Remove working platform from cold stream duct.

(32) Engines No.1 and No.3

(a) Install R.H. seal assembly (Ref. 78-31-10).

(33) Engine No.2

(a) Install R.H. interface translating fairing 435AR (Ref. 78-31-11).

(34) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

STOWED PROXIMITY SWITCH SENSOR - REMOVAL/INSTALLATION

1. Removal/Installation Stowed Proximity Switch Sensor

Service Bulletin referred to:

S.B.72-3732 - Re-routing of Electrical Harness Through the L.P. Compressor Case Support Structure ('A' Frame).

S.B.72-4073 - Improved module, on locked and stowed translating cowl indication system.

R S.B.78-6508 - Re-routing of electrical harness.

Referenced Procedures:

71-11-01	L.H. Hinged Cowl - Removal/Installation
71-12-05	L.H. and R.H. Upper Hinged Cowls - Servicing
78-30-00	Thrust Reverser - Servicing
78-30-00	Thrust Reverser - Adjustment/Test

Illustrated Parts Catalogue References:

The I.P.C. sections where parts disturbed during the following operations can be located are as follows:

78-31-51 Stowed Proximity Switch Sensor Installation

NOTE: Engines without S.B.72-4073 the junction block module is marked with black. Engines with S.B.72-4073 the junction block module is marked with red.

A. Remove Sensor

(1) Equipment required

ZZL-R-9511-16 Extraction tool

(2) WARNING: ENSURE THRUST REVERSER SYSTEM IS LOCKED IN REVERSE THRUST POSITION WHILE WORK IS IN PROGRESS.
Deactivate and tag thrust reverser and associated systems, and fit thrust reverser mechanical locks (Ref. 78-30-00, Servicing).

(3) Remove L.H. hinged cowl 413A or 414A (Ref. 71-11-01) for engines No.1 and 3, or open hinged cowl 433DL (Ref. 71-12-05) for engine No.2.

(4) CAUTION: ENSURE ELECTRICAL CONNECTOR IS FREE FROM LIQUID AND/OR SOLID CONTAMINATION BEFORE DISCONNECTING.
Refer to fig.401 (Sheet 1), disconnect electrical connector (1).

R (5) Remove harness clips

R (a) Engines without S.B.72-3732 and without S.B.78-6508
R remove clips (2), (3) and (4).

R (b) Engines without S.B.72-3732 and with S.B.78-6508
R remove clips (2) and (3).

R (c) Engines with S.B.72-3732 and without S.B.78-6508
R remove clips (2), (3), (4) and (5).

R (d) Engines with S.B.72-3732 and without S.B.78-6508
R remove clips (2) and (3).

(6) Refer to fig.402, remove screws and nuts (1) securing electrical plug (2) to pressure switch mounting bracket.

(7) Refer to fig.403, remove screws (1) and clamp segments (2).

(8) Move support bushing (3) along harness away from ring clamp (4).

(9) Unscrew ring clamp (4) and move along harness to support bushing (3).

(10) Using extraction tool from front of plug, push pins (5) out of insert (6).

(11) Remove shell (7), ring clamp (4) and support bushing (3) from harness.

(12) Cut-off pins (5) from their appropriate leads and discard.

(13) Remove ident sleeves (8), (9), (10), (11), (12) and (13) from harness, and retain for refitment.

(14) Refer to fig.402, remove bolt and nut (3) securing earth lead.

(15) Remove screws (4) securing sensor (5) to mounting bracket.

(16) Refer to Fig.401, carefully pull sensor harness through conduit then remove sensor (4) from engine.

NOTE: Before pulling sensor harness through conduit, attach a suitable 'pull through' to harness for use on re-installation of the harness. After harness has been pulled through conduit, remove 'pull through' from harness and leave in position.

B. Install Sensor

(1) Equipment required:

M22520/1-01	Crimping tool
M22520/1-02	Turret
ZZL-R-9510-16	Insertion tool
Clean, stiff bristled brush	

(2) Material required:

	British Spec./Ref.	American Spec./Ref.	OMat Item No.
Locking compound	Locktite '241'	Locktite '241'	8/67
Anti-chafe sleeve (as required)			

(3) Ensure thrust reverser is locked and systems are deactivated and tagged as detailed in operation 1.A.(2).

(4) Check length of harness plus sensor, which should be 42.50in. (1079,50 mm.) and cut harness to correct length if required.

(5) Bind harness with anti-chafe sleeve, leaving enough uncovered for fitting of plug.

(6) Refer to Fig.401, attach 'pull through', positioned in operation 1.A.(16), to sensor harness and carefully pull harness through conduit then remove 'pull through'.

(7) Refer to Fig.402, position sensor (5) on mounting bracket and secure with screws (4).

(8) Position harness earth lead on mounting bracket then fit and secure bolt and nut (3).

(9) Refer to Fig.403, fit ident sleeves (13), (12) and (11) to harness.

NOTE: Ident sleeves must be as near to connector as possible.

(10) Slide support bushing (3) and ring clamp (4) onto harness.

(11) Fit ident sleeves (10), (9) and (8) to their appropriate leads.

(12) Remove 0.250in. (6,35 mm.) of outer cover from end of each lead.

(13) Fit turret to crimping tool and set to blue position, setting 18.

(14) Insert bared end of lead into well of pin until it bottoms.

(15) Using crimping tool, crimp pin to lead.

(16) Repeat operations (14) and (15) for other two leads.

(17) Using insertion tool from rear of plug, fit pins (5) into their respective (red lead to 1, green lead to 2 and black lead to 3) numbered hole (Ref. A, fig.403) in insert (6). Check retention of pins in insert by gently pulling on appropriate lead.

(18) Screw ring clamp (4) onto shell (7).

(19) Position support bushing (3) then fit clamp segments (2) and secure with screws (1). Ensure support bushing (3) is equally displaced either side of clamp segments (2).

(20) Using a brush, apply locking compound to screws (1).

(21) Refer to fig.402, locate plug (2) on pressure switch mounting bracket then fit and secure screws and nuts (1).

(22) On engines incorporating S.B.72-3732, refer to fig.401 (Sheet 1) and correctly route harness across L.P. compressor case then fit and secure clips (2), (3), (4) and (5).

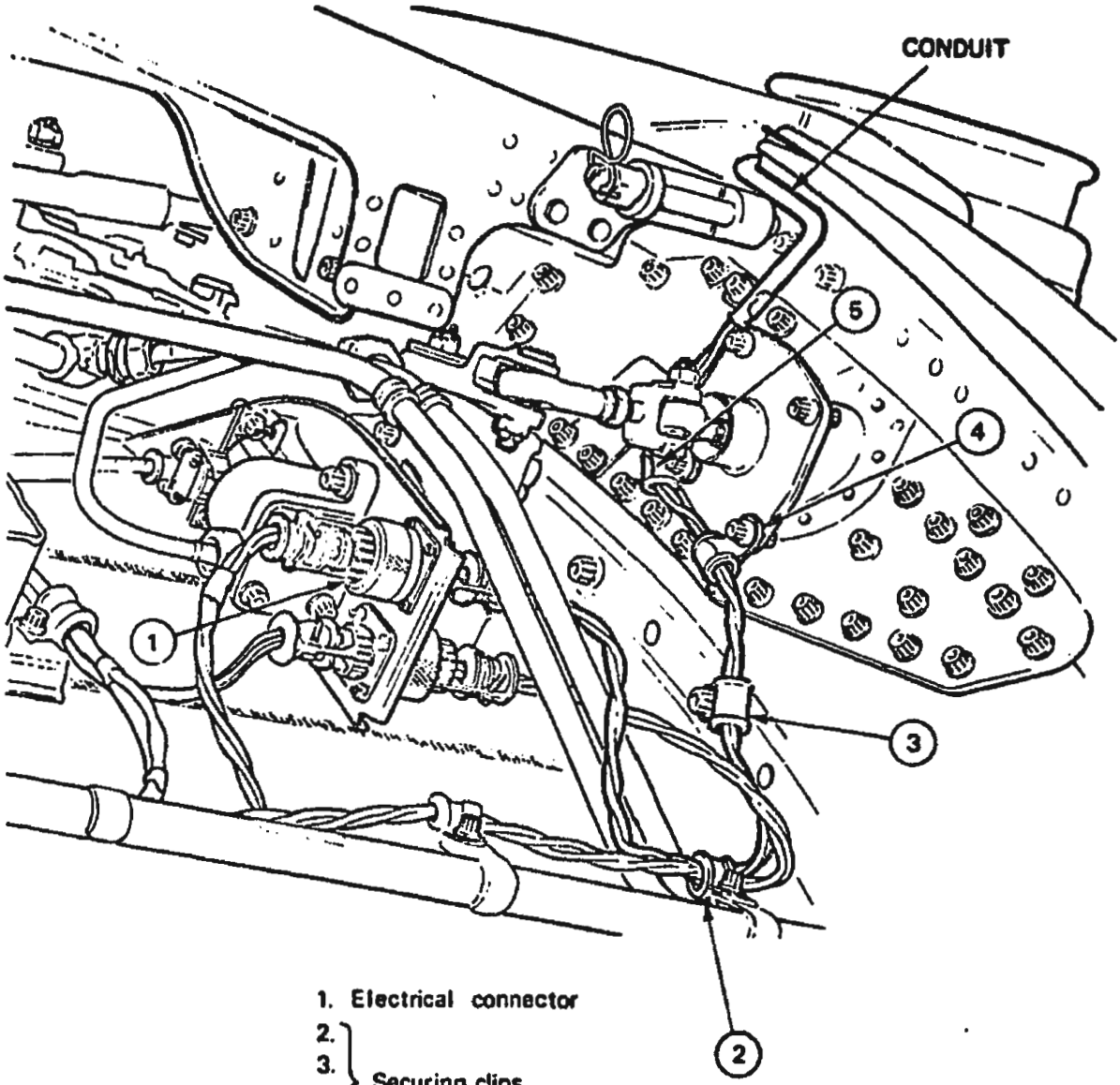
On engines not incorporating S.B.72-3732, refer to fig.401 (Sheet 2) and correctly route harness through clips (2), (3) and (4) then secure clips.

(23) CAUTION: ENSURE ELECTRICAL CONNECTOR IS FREE FROM LIQUID AND/OR SOLID CONTAMINATION BEFORE CONNECTING.
Refer to fig.401, fit and secure electrical connector (1).

(24) Unlock and reactivate thrust reverser and associated systems (Ref. 78-30-00, Servicing).

(25) Set stowed sensor target (Ref. 78-30-00, Adjustment/Test).

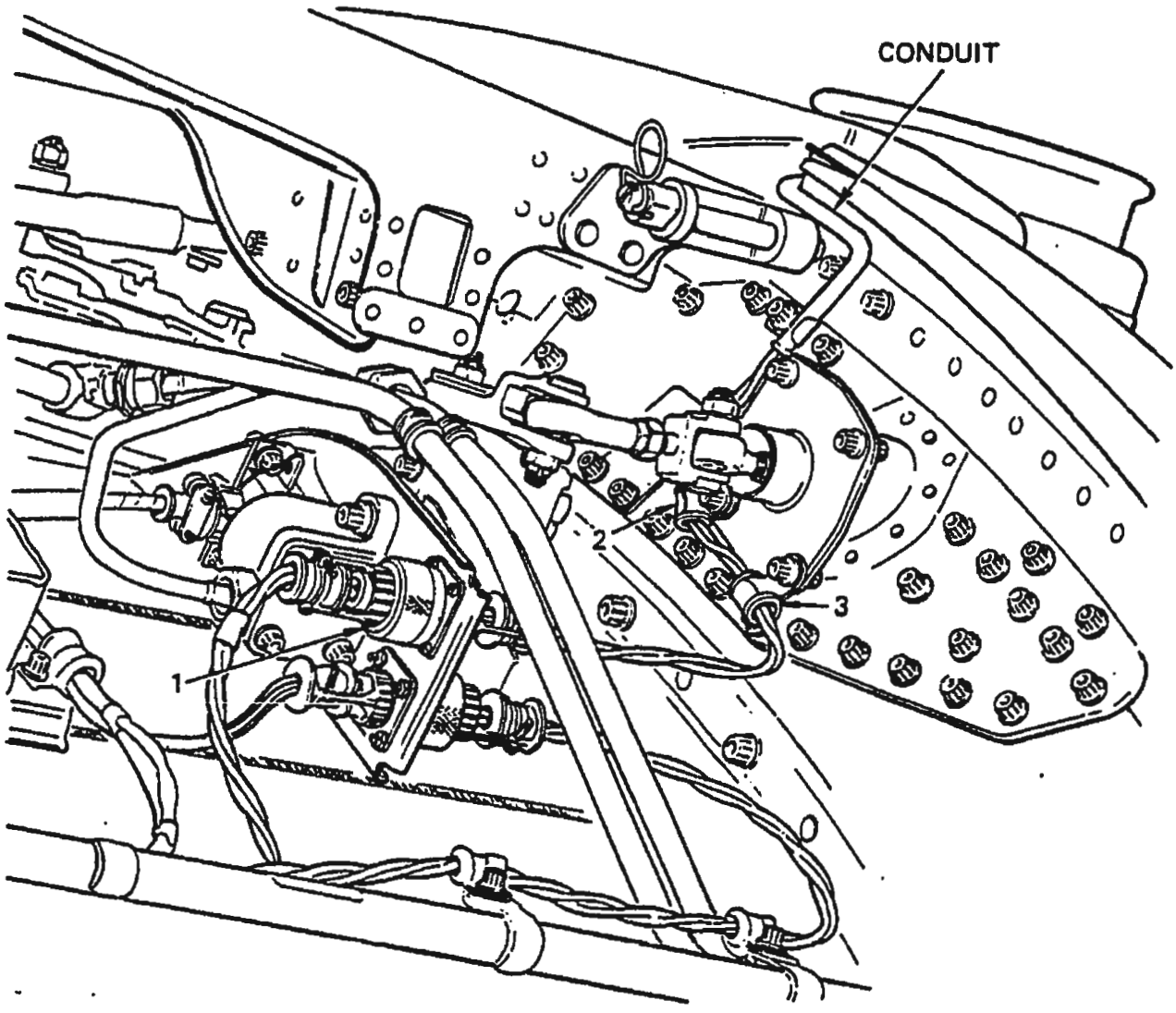
(26) Install left-hand hinged cowl 413A or 414A (Ref. 71-11-01) for engines No.1 and 3, or close hinged cowl 433DL (Ref. 71-12-05) for engine No.2.



1. Electrical connector
2. Securing clips
3. Securing clips
4. Securing clips
5. Securing clips

35259

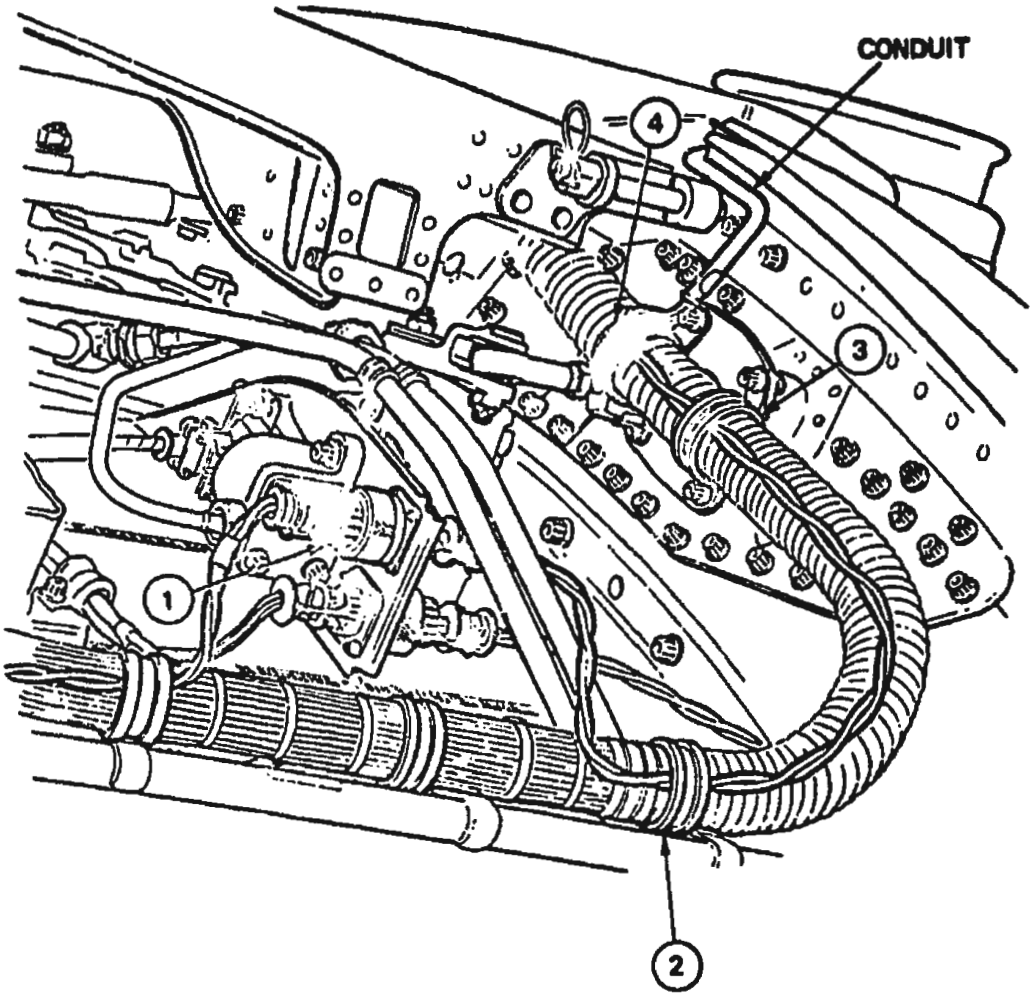
Harness disconnect points (S.B.72-3732) and (without S.B.78-6508)
Fig.401 (Sheet 1)



1 Electrical connector
2, 3 Securing clips

A2805

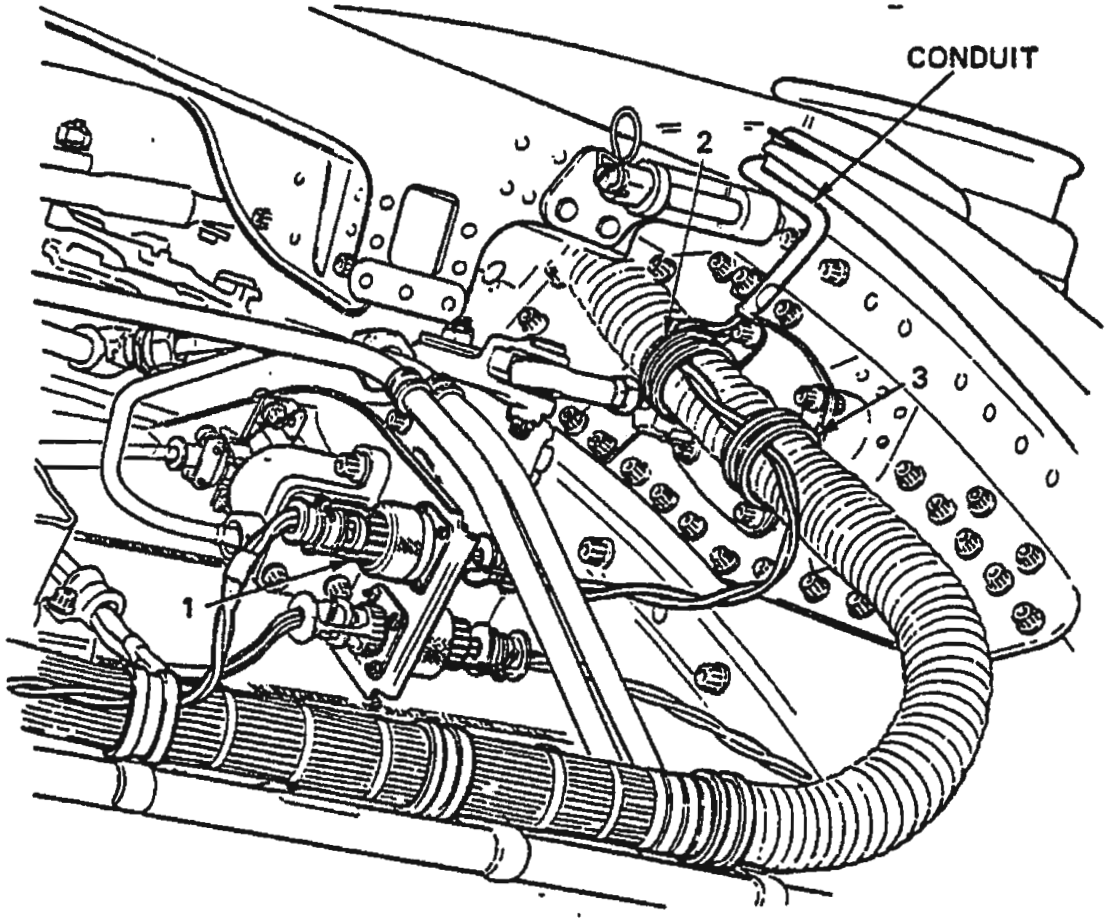
R Harness disconnect points with (S.B.72-3732) and with (S.B.78-6508)
R Fig.401 (Sheet 2)



1. Electrical connector
2. 3. 4. Securing clips

35280

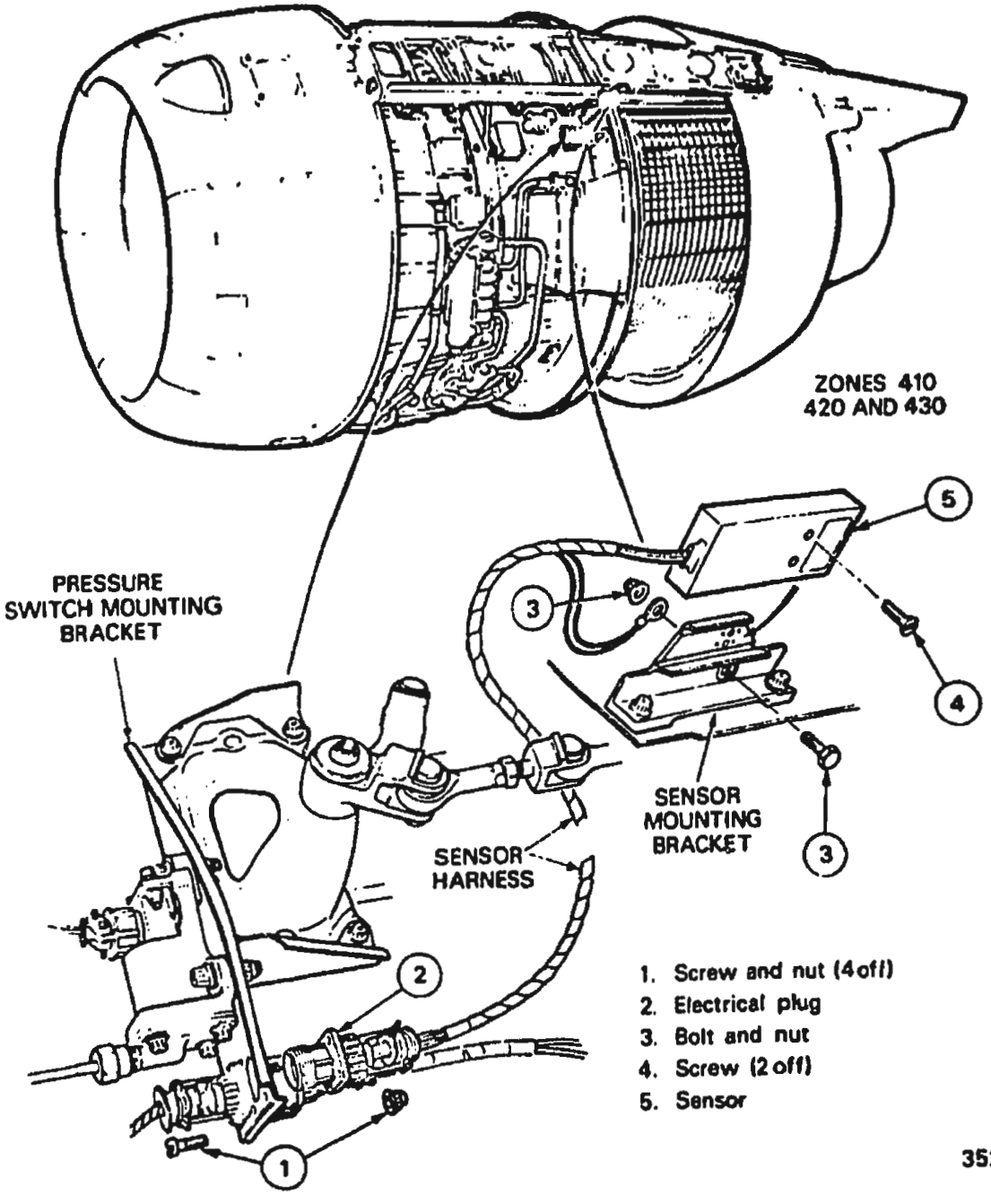
Harness disconnect points (Pre S.B.72-3732) and (Pre S.B.78-6508)
Fig.401 (Sheet 3)



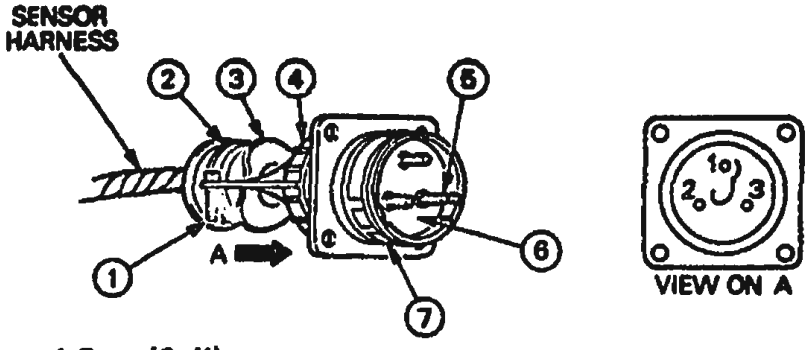
1 Electrical connector
2, 3 Securing clips

A2806

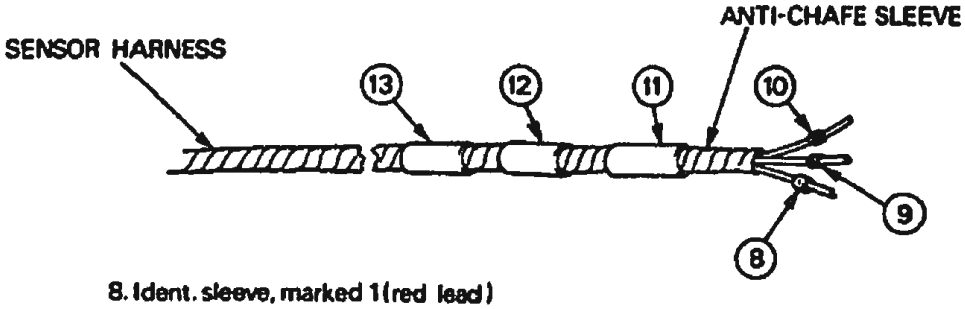
R Harness disconnect points (Pre S.B.72-3732) with (S.B.78-6508)
R Fig.401 (Sheet 4)



Sensor and harness disconnect points
Fig.402



1. Screw (2 off)
2. Clamp segment (2 off)
3. Support bushing
4. Ring clamp
5. Pin (3 off)
6. Insert
7. Shell



8. Ident. sleeve, marked 1 (red lead)
9. Ident. sleeve, marked 2 (green lead)
10. Ident. sleeve, marked 3 (black lead)
11. Ident. sleeve, marked 7831-7013A20 RED
    7831-7014A20 GRN
    7831-7015B20 BLK
12. Ident. sleeve, marked 7831-J705
13. Ident. sleeve, marked LJ 25210

35262

Sensor harness plug removal/installation
Fig.403